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CONSERVATION OF BIOLOGICAL RESOURCES

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Conservation of Biological Resource...

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COMMITTEE ON
MERCHANT MARINE AND FISHERIES
HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRD CONGRESS

FIRST SESSION

ON

PRESERVING NATURAL HABITATS

APRIL 1, 1993

Serial No. 103-9

Printed for the use of the Committee on Merchant Marine and Fisheries

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CONSERVATION OF BIOLOGICAL RESOURCES

THURSDAY, APRIL 1, 1993

House of Representatives,
Committee on Merchant Marine and Fisheries,
Washington, DC.

The committee met, pursuant to call, at 10:08 a.m., in room 1334, Longworth House Office Building, Hon. Gerry E. Studds [chairman of the committee] presiding.

Present: Representatives Studds, Hughes, Tauzin, Ortiz, Hochbrueckner, Pallone, Laughlin, Unsoeld, Reed, Lancaster, Andrews, Furse, Green, Hastings, Hamburg, Lambert, Eshoo, Barlow, Cantwell, Deutsch, Fields, Bateman, Coble, Weldon, Gilchrest, Cunningham, Kingston, Pombo.

Staff Present: Jeffrey Pike, Will Stelle, Mary Kitsos, Sue Waldron, Gina DeFerrari, Dan Ashe, Lesli Gray, Leigh Clayton, Harry Burroughs, Cynthia Wilkinson, Judy Alvarez, Tom Melius, Margherita Woods.

STATEMENT OF HON. GERRY E. STUDDS, A U.S. REPRESENTATIVE FROM MASSACHUSETTS, AND CHAIRMAN, COMMITTEE ON MERCHANT MARINE AND FISHERIES

The Chairman. Members and witnesses will take their place and introduce themselves to their respective critters, and we will begin. Let me begin by observing that in consultation and agreement with the ranking member, the gentleman from Texas, and out of respect to the time constraints of the distinguished members of the Cabinet who are with us this morning, the opening statements will be confined to myself and to the ranking member.

I think members will understand that it is not every day that we have two, never mind three, members of the Cabinet in attendance. Ms. Browner is expected at approximately 10:30, and each of the members of the Cabinet, as I understand it, has a different, necessary departure time. We will try to accommodate questions from members and the needs of the officials of the Cabinet to proceed on their way.

The committee will come to order. Tomorrow, President Clinton, Vice President Gore, and other members of the Administration, including the three distinguished members of the Cabinet who are with us this morning, will convene the Forest Summit in Portland, Oregon. This will be a remarkable, and we very much hope successful, attempt to resolve the raging controversy over preserving ancient forest habitat in the Pacific Northwest.

The convenient symbol for all sides in this dispute has been the spotted owl. On its feathery little shoulders seem to rest the fate of every timber family, every logging community, and if we are to believe some of what we hear, the entire social fabric of the northwest region. Lesser critters clearly would have long since flown south.

There are many lessons to be learned from what has happened in Oregon, Washington, and Northern California, not the least of which is that it makes no economic or biological or common sense to put off painful decisions until they are excruciating decisions. That these painful decisions were not made earlier is not the fault of the owl, nor is it the fault of the logger. It is the fault of a system that valued political posturing over problem solving; a system that offered the mirage of job stability based on a program of intense overexploitation that was destined to come crashing down; a system that refused to see the value of the forest through the value of the trees.

Thus, our country now finds itself at an environmental crossroads, and we really have three choices: We can ignore the future—ignore the possibility that another taxol or a cure for leukemia or a treatment for AIDS will be developed from studying the bug or the bird or the fish that lives in the next habitat mankind wants to destroy.

We can continue down the road we are on adding 100 critters every year to the endangered species list and provoking 100 controversies with each listing, or we can do better. We can exercise some foresight, a commodity in short supply lo these many years, and responsibly conserve the biological resources of this nation.

This third option is why we are here today. It is my hope to work with the Clinton Administration, which is easily differentiated from its predecessor by the fact that this Secretary of the Interior will not tell us to deal with ozone depletion by wearing a hat and sunglasses, to develop a plan that will help to keep everyone—owls, people, and gnatcatchers alike—alive.

Such a plan must begin with the policies of the Federal Government. Uncle Sam owns one-third of the land mass of this country—525 million acres managed by the Forest Service and the Bureau of Land Management alone. You would think that the future of species on these lands would be secure, but they are not. Over 200 of the more than 700 species listed are found primarily on Federal lands.

Our Federal land agencies must lead by example. Until our own house is in order, we will be hard-pressed to ask private landowners to radically change their land management practices. Thankfully, these agencies are now led by Bruce Babbitt and Mike Espy, men who know that today's market price for a board-foot of wood can be surpassed many, many times over by the value of tomorrow's discovery of taxol.

Preserving natural habitats is not only a task for land managers but for pollution preventers as well. We have a broad array of Federal environmental laws, but they are falling short of the mark. Among the leading causes of species endangerment is water pollution. The Clean Water Act may have done pretty well at reducing public health risks, but those many creatures that live on, by, or in the water have not fared so well, and we must do better than that.

To address these issues, we have Secretary Babbitt, Secretary Espy, and, in a few moments, Administrator Browner, and witnesses from around the country. We also have, I would note, critters before us, courtesy of the Endangered Species Coalition, and I don't know whether members choose to attribute any particular significance to the critter assigned to them. I would note that the distinguished ranking member was given an elephant which he has already packed, I understand, for his younger daughter.

And I would also note for the record, and I apologize to the members of the Cabinet, that at the place of each member of the committee are these remarkably colorful endangered species shorts. I assume the endangerment is not a reference to those who would wear them, but in the event that they are missing and your critters are without them, members of the Cabinet will be provided with these as well, particularly for your trip tomorrow. I now call on the distinguished ranking member, the gentleman from Texas.

STATEMENT OF HON. JACK FIELDS, A U.S. REPRESENTATIVE FROM TEXAS, AND RANKING MINORITY MEMBER, COMMITTEE ON MERCHANT MARINE AND FISHERIES

Mr. FIELDS. Mr. Chairman, first of all, Jordan Fields wants to thank whoever gave her the elephant. She is going to love that elephant so thank you very much. Mr. Chairman, I would like to join with you in welcoming Secretary Babbitt, Secretary Espy, a former colleague of mine, Administrator Browner, when she does appear, and the distinguished Mayor of San Antonio, the Honorable Nelson Wolff.

The intensity of our interest in conserving this country's biological resources and our differences about how to achieve that end will become quite evident as this hearing progresses today. Yet, no one should doubt this committee's commitment to maintaining a strong Endangered Species Act, nor assume that our differences will deter us from approving that particular Act. And contrary to what some people are saying, this law, this Act does need to be improved.

And let me sound the alarm to warn my colleagues whose states have not yet been affected that there are train wrecks waiting to happen in every county, in every district, and in every state across America, and I know this to be a fact because it has happened in Texas.

As the result of a Federal Judge's ruling, designed to protect the one-inch fountain darter, the citizens of San Antonio are facing a 60 percent reduction in their drinking water supply. In order to comply with this ruling, current users will have to drastically reduce the amount of water that is pumped from the 175 mile underground river known as the Edwards Aquifer which is the sole source of water for the city of San Antonio.

Mr. Chairman, there is no easy or inexpensive way to replace the water now obtained from the Edwards Aquifer. In fact, it would take years for alternative sources of water to become available and at a cost of up to $1.5 billion. Unless relief is forthcoming, the economic consequences for San Antonio will include a $5.2 billion annual reduction in economic output; a $3.3 billion reduction in annual income; a $2.6 billion reduction in wages and salaries; a $1.3 billion reduction in retail sales; and a permanent loss of more than 136,000 jobs.

This interpretation of the Endangered Species Act simply does not make sense. It places the needs of a fish ahead of the needs of a 1.5 million men and women in San Antonio and in the surrounding areas. In addition to the adverse impacts on ordinary citizens in San Antonio, farmers and ranchers in the surrounding areas would have their livelihoods threatened. How do you grow crops or how do you raise cattle without water? If this ruling stands, who truly will be the endangered species?

Mr. Chairman, this ruling is not just an inconvenience; it is not just a threat to economic well-being; it is, in fact, the abrogation of basic rights. For us as Texans, this ruling means that the rule of capture—the right to control what is under our property—would be obliterated. For Texans, this right is as precious and as basic as the right to own land.

Under the Act, individual rights, property rights, and economic considerations are effectively ignored. These are devastating impacts, and this judicial ruling makes it clear why the Endangered Species Act must be reformed. We must clarify that this law was never intended to prevent the availability of our most basic human necessity, that being water. We must amend the Act to ensure that the needs of people are considered just as carefully as are the needs of one-inch fountain darters. In short, I think we must add some balance to the Endangered Species Act.

Mr. Chairman, I want to compliment you for holding this hearing. I look forward to working with you, with Secretary Babbitt, with Secretary Espy, Administrator Browner, Mayor Wolff so that we can get this train on the right track. And I think this is important, and I am very glad that you called this hearing today.

STATEMENT OF HON. H. JAMES SAXTON, A U.S. REPRESENTATIVE FROM NEW JERSEY, AND RANKING MINORITY MEMBER, SUBCOMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES

This 103rd Congress marks the 20th anniversary of the Endangered Species Act. The Endangered Species Act is perhaps the most important piece of conservation legislation in the history of the United States. Passed in 1973, the intent of Congress, as stated in the Act's purpose, was to "provide a means whereby the ecosystems upon which species depend may be conserved..."—giving legal legitimacy to the concept that all species and their habitats are interdependent—and, that the increasing loss of species world wide serves as the proverbial "canary in a coal mine" for the health of our own species.

Unfortunately, the 20-year evolution of the ESA has proven less than successful for conserving ecosystems and their living resources.

Currently, the ESA has two fundamental flaws. The first relates to the fact that it is triggered only after a species has already declined to such a level that its population is "threatened" or actually "endangered" of becoming extinct. According to the 1991 Annual Report by the Council on Environmental Quality, approximately 9,000 U.S. plant and animal species may be at risk from extinction. As of January 1992, only 676 species were listed and 3,650 were candidates still awaiting protection. Of the 676 listed species, only 397 have recovery plans. At the rate of 100 listed species a year, the laws for managing our natural resources have failed to prevent a chronic decline in biodiversity and the ESA has become a law of last resort and crisis management.

The second flaw is the failure to implement the ESA on an ecosystem scale. Instead, we have implemented it on a species-by-species, piecemeal basis. This has caused economic conflicts in which great investments and jobs have been allowed to develop only to be abruptly stopped by some unsuspecting critter in trouble. This hasn't done much for the reputations of endangered species, and it has done little to improve their populations with the exception of a few high-profile animals. The one thing it has done is encourage the *arbitrary* division between economic and ecological interests—giving way to such public battles as that of the snail darter and the spotted owl.

It is ironic in this twentieth anniversary year of the ESA, that its reauthorization may finally focus in on its intended purpose—to conserve ecosystems as a whole—thereby preventing species from being listed and economic conflicts from occurring.

Under the leadership of this Committee and its members, I hope reauthorizing legislation will facilitate a multi-species ecosystem approach that preserves critical habitats while assisting states in determining where economic growth can safely occur before financial investments are made and jobs are placed in jeopardy.

Beyond concerns over socioeconomic impacts of the Act, and the need to shift the Act toward prevention rather than crisis, there will be other issues to be debated. One specifically will be the issue of listing subspecies as endangered. I suspect that those of us who like to fish or hunt ducks, appreciate the diversity subspecies provide. Nevertheless, it has become increasingly controversial. I hope this Committee will authorize language that facilitates scientific-based decisions to be the guiding principle in such matters.

I look forward to hearing from our witnesses today and welcome both Secretary Babbitt and Administrator Browner to the Committee.

Thank you, Mr. Chairman.

STATEMENT OF HON. MICHAEL N. CASTLE, A U.S. REPRESENTATIVE FROM NEW JERSEY

Thank you, Mr. Chairman. Initially, I want to express my appreciation to you for calling this hearing on the eve of the President's Forest Summit. I also look forward to the testimony and dialogue with two of this country's environmental leaders, my former colleague and governor, now secretary Bruce Babbitt, and EPA chief, Carol Browner.

The United States has a long history of being a leader in environmental protection, having created the first national park system, the most extensive wildlife refuge system and comprehensive pollution control laws.

However, the environmental challenges we face today are quite different from those in the past. We recognize today the importance of preserving whole ecosystems and critical natural areas, rather than assembling piecemeal parcels of land.

We also recognize that our quality of life depends on both a healthy economy and a healthy environment in which to live. We must pursue both goals simultaneously—one must not be sacrificed for the other.

As this Committee and Congress as a whole begin grappling with reauthorization of the Endangered Species Act, we must focus on how to get ahead of the extinction curve, rather than dealing with the consequences of un-coordinated environmental protection of threatened species and the impact on economic growth.

Finally, Mr. Chairman, I am proud of Delaware's environmental accomplishments. However, even in a small state, such as Delaware, there are 13 endangered and threatened species. I firmly believe that through cooperative efforts among Federal, state, and local governments, the business community and environmentalists, we can successfully confront the environmental challenges we face today.

The CHAIRMAN. I thank the gentleman, and I thank the members for their understanding and forbearance. On behalf of all of us, I welcome our distinguished witnesses. I think your presence here—the two, soon to be three, of you—plus the extraordinary interest evidenced by people in and unable to get into this room indicate that in some very real ways you have the whole world in your hands. We are very happy that it is you in whose hands it lies. Secretary Babbitt, welcome.

Secretary BABBITT. Mr. Chairman, thank you. Secretary Espy has some time constraints, and with your permission, I would like to yield to his presentation and then if I could follow him, I would be very grateful.

The CHAIRMAN. Certainly. The distinguished Secretary of Agriculture—Mike, welcome back.

STATEMENT OF THE HONORABLE MIKE ESPY, SECRETARY, U.S. DEPARTMENT OF AGRICULTURE

Secretary Espy. Thank you. Thank you, Mr. Chairman, and to Jack, I do appreciate this, and, Bruce, thank you for allowing me to go first. You see how well we work together, Mr. Chairman.

I thank you for allowing me to come once again, and if I had known you would give gifts like this, I would come more often. And though I really do appreciate this tiger, you can hold the shorts. That is all right.

The Chairman. Nothing like ingratitude.

Secretary Espy. Thank you. Mr. Chairman, I welcome this opportunity to appear before you today along with my colleagues, Secretary of the Interior and Administrator Browner, to give you my vision of the role the USDA will play as the Clinton Administration charts a new course in our efforts to protect and conserve our precious natural resource.

It is my intent, Mr. Chairman, to ensure that the USDA works with the Department of the Interior, will work with the EPA to conserve biodiversity. Now, we tried to demonstrate this team approach this past weekend when President Clinton asked his Secretary of the Interior and the Secretary of Agriculture to travel out to the Pacific Northwest. We tried to demonstrate this teamwork approach in advancing the Forest Conference, which, as you know, will be held tomorrow. We had a very tough schedule. In combination, we were there about six or seven days. We tried to have a schedule that would complement one another. There were very few voids left as we traveled back to Washington, again, to demonstrate the Forest Service will now work well instead of arguing with the BLM. The Forest Service and the BLM and the EPA will work together.

For my own part, Mr. Chairman, it was amazing as a former Congressperson from the Mississippi delta, an area without virtually any trees at all, to stand beneath trees that had been there for about 500 years or more. It was just incredible to experience the majestic nature of these old- growth forests.

In my three-day period, I visited watershed areas. I visited an area of a blown-down forest. Some want to harvest that timber because they said that they could have gathered at least 550 trucks full of timber, and others wanted to have this timber remain on the ground for the important development of owl habitat. We also met with mayors and community leaders and unemployed loggers, teachers, all telling us that as we attempt to move forward on this incredible biodiversity and ecosystem management that they wanted to remind us that people should remain a part of the ecosystem.

We have learned that efforts to protect the northern spotted owl and old-growth ecosystems were greatly complicated because different Federal agencies took different and sometimes conflicting positions on management strategies. The President has clearly stated that this lack of policy must end, and this lack of policy coordination must end. We at USDA are committed to that purpose. A good example, again, of this approach is this forestry conference in which our three organizations will be participating tomorrow in Portland, Oregon.

Today, I would like to very briefly discuss the role that USDA can and will play in promoting conservation and stewardship of the forest, range, and croplands of the United States with particular focus on our role in maintaining biodiversity. I do believe that USDA can play a unique and critical role in the conservation of biological diversity. The Forest Service manages 191 million acres of forest, rangelands, and grasslands in the National Forest System. Together with the Department of the Interior, we serve as our Nation's ecological bank.

Just as our society is strengthened and made rich by the diversity of our citizens, so it is with our natural environment. A wide diversity of plant and animal species thriving in their natural habitat is an indication of a strong and healthy environment.

In recent years, the concept of biodiversity has come to the forefront as one of the most important issues in natural resource management. Although there are many different thoughts on what biodiversity is, it is generally concluded that biodiversity is maximized in diverse natural communities containing a variety of plant and animal species. Diverse plant and animal communities tend to be more resilient and ecologically stable.

We all realize that farming, ranching, mining, and a host of other human activities can effect biodiversity. While we can no sooner abandon farming and commodity production than stop breathing, our programs can be designed to maintain biodiversity as well as produce such things as timber, crops and livestock. Experience teaches us that the most practical way to accomplish this is to attend first to the land and to take a more holistic approach in managing the land and the resources it supports.

How we use the land affects biological resources and important habitats in ecosystems in many ways. Over time, many land use activities can damage the value of soil and water resources. For example, Mr. Chairman, monoculture farming—growing the same crop on a large acreage in the same field year after year after year—sharply reduces the diversity of plant cover. It reduces landscape diversity and may eliminate winter cover, nesting areas, and food plants for many wildlife species.

Draining wetlands to grow crops can reduce breeding areas for waterfowl and other wildlife. Overgrazing results in less food and cover for wildlife which must then compete more intensely with each other and with domestic livestock for the food and cover that remains. These same practices contribute to increased flooding and sedimentation, poor water quality, degradation of fish habitat, and loss of the soil's productive capability.

As we are all aware, nature does not recognize political or jurisdictional boundaries. This is but one reason why it is so important to have the various Federal agencies singing from the same hymnal. In addition, it points to the need to establish cooperative relationships with state and private landowners. The USDA has had a long and proud tradition in leadership in conservation and forestry, and we will continue to play a central role in the future. We are beginning to realize the importance of protecting biodiversity across the landscape and on a watershed basis.

The Soil Conservation Service has an important role to play in improving management of ecosystems and biodiversity. As a source of technical support to farmers, ranchers, and others, SCS provides leadership in tackling tough issues like nonpoint source pollution, wetland protection, and watershed restoration and management, mainly on non-Federal, agricultural lands. Land users work with nearly 3,000 locally organized and locally run conservation districts in the United States. This delivery system and the traditional role of providing assistance to private land users makes SCS a key to fostering the nation's efforts to conserve biological resources and important habitats on private lands.

The Agricultural Stabilization and Conservation Service, otherwise known as ASCS, programs provide substantial cost share and other financial incentives to aid farmers in making land and water conservation investments. Through the Conservation Reserve Program, ASCS has helped farmers protect over 35 million acres of highly erodible and other environmentally sensitive cropland. Seventy-five percent of the 50,000 acres approved for restoration in the first year of the Wetlands Reserve Program are in endangered species recovery plans, will directly benefit endangered species, or lie within ongoing Federal or State wildlife project areas.

In addition, the natural resource program of the Extension Service has provided valuable information and assistance to thousands and thousands of farmers, ranchers, and woodlandowners to guide them in making environmentally sound management decisions.

The Forest Service has a wealth of resources and expertise to bring to bear on matters related to the conservation of biodiversity within the United States and across the world. The Forest Service remains the only Federal land resource agency with a clear mandate to manage its lands to conserve biological diversity. The National Forest Management Act of 1976 requires the Forest Service to provide for biodiversity of plant and animal communities based on sustainability and capability of the specific land area.

Fully half of the Nation's softwood timber, big game, and cold water fisheries originate on National Forest lands. Over 75 percent of the water in the West has its source on National Forest land, and just under one-third of the currently listed threatened and endangered animals and plants are located on National Forest lands.

Just last year, the Chief of the Forest Service announced the Agency's commitment to ecosystem management. With this approach, we intend to apply scientific knowledge of the way in which all of the important components of the ecosystem fit together to better guide resource management.

Mr. Chairman, one example of the Forest Service's efforts in the sensitive species program is this program entitled "Every Species Counts." This is a proactive management effort to head off the need for future threatened and endangered listings. There is one thing that I learned on my trip out to Oregon is that you have to take a comprehensive approach. You can't develop one thing to protect the spotted owl and then another thing to protect the marbled murrelet and then another thing to protect the salmon. It all works together.

The program provides the foundation upon which to build an ecosystem approach to evaluating habitats that might be at risk and to ensure that management activities do not allow a decline in the habitat of identified species. Our ecosystem approach might be likened to preventive medicine rather than intensive care treatment of a patient in critical condition.

The research program of the Forest Service is particularly key in maintaining diverse ecosystems across the United States and abroad. It also illustrates one of the strengths that we can bring to the new Federal conservation partnership. Knowledge is critical to success in management our natural resources. Forest Service research provides that knowledge for many Federal and State agencies engaged in managing and protecting healthy ecosystems. In addition, the International Forestry Program is rapidly becoming the world leader in providing scientific and technical support for international resource management programs.

As part of our effort, we must commit the resources needed to monitor our actions and to measure our progress over time. Strategies like ecosystem management and watershed planning are for the long-term. We must establish the capability to accomplish what we set out to do and take corrective measures when it appears that we have strayed off course. Benchmarks to measure our progress are also needed in this period of fiscal restraint to make sure that the American taxpayer is getting the biggest bang for the buck.

But the truth is, Mr. Chairman, our knowledge of ecosystem functions is still quite limited. Even the best scientific research is often not much more than interim conclusions drawn from incomplete data, and the scientists will tell you that. This points out the need for intensive research and monitoring. It also points out why management must be sufficiently flexible to be able to change as our scientific information changes. To this end, we must strengthen the link between research and management so that our policies have a strong scientific foundation.

Another concept that should guide our conservation and forestry programs is the concept of sustainability. Management strategies, be they for agriculture land or forest, can only be effective if they lead to sustainable production of the goods and services which the land provides. Sustainable production, in turn, can provide the basis for sustaining the economies of rural communities and provide them with a more certain future.

Again, the Forest Service has played an active role in developing the science and maintaining the conservation of biodiversity at a regional, national, and international level. Our participation began with the 1989 Keystone Dialogue which heightened national attention to biodiversity. From there, the Forest Service chaired the 1992 International Sacramento Conference on Biodiversity in Management Landscapes and is currently editing the conference proceedings. Also in 1992, the Forest Service represented the USDA in preparing for the United Nation's Conference on the Environment and Development held in Rio de Janeiro, Brazil. As a followup to these efforts, the Forest Service will hold an agencywide workshop to identify strengths and limitations for conducting research and managing for biodiversity.

In summary, I would like to say that I am committed to a new partnership among the Federal agencies to conserve our biological resources. The strength of a good partnership comes from the individual strengths that each member brings to that partnership. I believe that USDA brings many strengths to this new conservation partnership and has the capability to move aggressively to deal with many of our natural resource and environmental problems facing this nation in concert with the Department of the Interior, the EPA, and the National Marine Fisheries Service in the Department of Commerce.

We must seek balanced solutions to the complex natural resource management issues facing us. Mr. Chairman, we have the resources, we have the professional expertise, and we certainly have the will to get the job done. Thank you.

[The prepared statement of Secretary Espy may be found at the end of the hearing.]

The CHAIRMAN. Thank you, Mr. Secretary. Your enthusiasm is obvious and evident. You clearly have been to the mountaintop in the form of the old-growth forest, and it is wonderful to hear you talking about departments singing from the same hymnal. And in the case of your colleague on your right, Secretary Babbitt, it is even more miraculous to see component agencies of a single department singing from the same hymnal which may be in part because you wrote some of the words yourself, sometime ago. Secretary Espy, thank you. Secretary Babbitt, welcome.

STATEMENT OF THE HONORABLE BRUCE BABBITT, SECRETARY, U.S. DEPARTMENT OF THE INTERIOR

Secretary BABBITT. Mr. Chairman, thank you. I have submitted a written statement, and in lieu of taking that much time, perhaps I could just summarize some of the key points. I must start with the Endangered Species Act, and like Secretary Espy, I suppose one reference point is, in fact, the train wreck in the Pacific Northwest and the upcoming Forest Conference tomorrow morning.

The use of the Endangered Species Act in the Pacific Northwest is a textbook study of what went wrong and how not to use a piece of legislation which I think has a great deal of positive possibilities in it. The problem in the Pacific Northwest 10 years later, I think, is quite simple. The agencies, specifically the Department of the Interior, but all of them, in charge of administering this Act chose to ignore the problem. When the problem arose, they chose to obfuscate, to delay, to equivocate, and ultimately wound up fighting each other rather than solving the problem.

We had the specter of a 10-year struggle in the Northwest in which the Federal Government was at odds with itself. The passive reaction focused first on a single species and did not understand the ecosystem implications. Ultimately as a result of that footdragging and I think at times just outright bad faith, inevitably the problem, the gridlock, and the impasse dropped into the hands of a Federal Judge.

Now, it is manifest to me that the administration of the Endangered Species Act is not ideally something that ought to be carried out by a Federal Judge issuing injunctions. That is what happened in the Northwest. The negative lesson from that woeful experience which reflects, I believe, so badly on my department, the Department of Agriculture, and the Federal Government is that this Act must be used proactively. If it is going to work, we need to see the problems before they become crises while there is still time and flexibility to deal with them rather than being driven into a corner in a knockdown, drag-out fight which has disruptive consequences for the economy and invites the judicial system in.

We must deal with them early on while there is flexibility. We must recognize that the issue is always habitat, and that, in turn, drives us to an analysis of the entire ecosystem, and, as Secretary Espy alluded to, a look at not just one species but all of the components of that ecosystem. And the lesson, I think, is under the Endangered Species Act we have the power to do those things—it hasn't been done in the past, but I believe the possibilities are there.

Now, I would invite the attention of this committee as you set about your work to three case studies which I think to some degree will illustrate what I am talking about. None of them are perfect examples because in each case there was a fair amount of delay, but, nonetheless, they have possibilities. The first one you may have read about last week in Southern California regarding the decisions that have been made with respect to the California gnatcatcher which inhabits the coastal sage scrub in a zone extending from Los Angeles down to San Diego squarely in the pathway of some of the most intense development pressures anywhere in the United States.

The important thing there is the State of California, rather than obstructing these efforts, has enacted its own habitat conservation legislation which, in turn, has impelled local jurisdictions to get in on the planning act. This we have in California an impressive effort by San Diego, Orange County, Riverside County, and other entities operating under the framework of a state law to see if we can get ahead of this particular issue.

That has enabled the Fish and Wildlife Service, utilizing the Endangered Species Act, to take a step back, to list the bird as threatened and to invoke a rarely used section of the law which, in effect, defers to the State of California and the local planning jurisdictions and says, "If you set targets, if you are serious about finding these tradeoffs and managing the habitat, you will be the lead agency, and we won't have to step in." I think it is an important example. Will it succeed for sure? We don't know. It has never been tried before. Are there risks? Yes, of course there are, but the environmental community and the development community, at least for the time, have said, "This is an experiment worth trying. We can't just stand back and wait for a Federal Judge."

My second example that I would direct your attention to is in the State of Texas in Travis County in the city of Austin where it turns out that the imperiled ecosystem immediately to the west of the city happens to be the most attractive place for developers to go. If you have ever been to Austin, you will understand why the Balcones hill country to the west is really quite an extraordinary place.

Again, what we have underway is a large-scale, cooperative effort in this case being driven under Section 10 of the Endangered Species Act in which the city of Austin and Travis County have taken the lead—have gone actually to the voters to get bonding authority for habitat acquisition. The Fish and Wildlife Service has responded with aggressive leadership from Congressman Pickle to create a wildlife refuge in part of this area. And, again, people are moving ahead to put together a habitat plan with county, city, and Federal cooperation.

The last one I would point you to is interesting because it is on Federal land principally being driven by the Bureau of Land Management in Las Vegas, Nevada. The problem there very simply is that as Las Vegas grows, it encroaches upon the habitat of the desert tortoise which has been listed as an endangered species. Clark County and the city of Las Vegas again in a very proactive way went to the Fish and Wildlife Service for an incidental take permit under Section 10. We have worked out an arrangement of really extraordinary power in which developers are allowed to make incidental takes. Assessment is made on each lot that is sold, which, in turn, goes into a conservation fund, which, in turn, is financing habitat acquisition, which is matched together with the planning process of the Bureau of Land Management. This plan is evolving not without difficulties but in a very impressive joint planning and management exercise among all the affected parties.

Now, with those three examples, I would like to draw two or three conclusions for you. The first and most obvious one is the need for proactive administration. It doesn't work to sit back until there is a crisis. We must anticipate them. Number 2: In order to do that effectively, we have to have good science. Secretary Espy referred to this, and it is certainly true. We have to understand where the problems are going to come up. We need to have an inventory of the biodiversity of the land carried out on the basis of not jurisdictional lines on maps but on the basis of ecosystems.

Now, it is that requisite which has given rise to our proposal within the Department of the Interior to organize a national biological survey which will bring together the disparate but very impressive field biology resources in the Fish and Wildlife Service, the National Park System, the Bureau of Land Management, the Bureau of Reclamation, the United States Geological Survey, and others to see if we can mount in cooperation with state, local, and university resources an effort to do these biological surveys, to get them up with the assistance of state game and fish organizations, the Nature Conservancy, and others onto geographical information systems which will allow us to do what the biologists refer to as gap analysis. It is a way of anticipating the problems, getting ahead of them, and solving them before the train wreck occurs.

Finally, again, as Secretary Espy pointed out, we must coordinate efforts among Federal agencies because it is not enough—the Endangered Species Act really isn't enough. We have got to get further ahead than that into good management of Federal lands, the use of the Soil Conservation Service to promote good management practices, the use of the Clean Water Act, and all of the other tools.

Now, the requisite for this, I must tell you in conclusion, came to my attention in an extraordinary way about a month ago. It turns out that down in Alabama there is a lawsuit going on in the United States District Court called Mud v. Reilly. To summarize a very complicated, ongoing lawsuit at the core of an intense disputation, is a lawsuit between EPA on one side and the Department of the Interior on the other—same government, same President then and now between our two agencies, and the fight is about whether or not we have to consult with each other in the administration of the Clean Water Act. That is it. This lawsuit has been going on forever.

Now, I called Carol Browner up, and I said, "How come we are fighting each other in the Court in Alabama? Do you think we can consult? Why don't we start consulting?" Well, as a result of that, we have come together with Jim Baker from NOAA, and we are going to write up a little memorandum and go back to the Judge and say, "Hey. In this Administration, we are willing to talk to each other. We don't need a Federal Judge to order us to talk."

Now, that concept simply needs to be carried through in a number of places. One that will be coming up is the Clean Water Act because it is clear that EPA, under Ms. Browner, will be moving to administer that Act in a way that drives real consequences in the management of ecosystems and fish and wildlife. And it will require a consultation process with the Endangered Species Act administration which is divided between NOAA and the Department of the Interior.

The role of Mr. Baker at NOAA, I think, is critical because he has the marine side of the Endangered Species Act, and, again, we are meeting regularly simply to see if we can work out those issues. I think that one thing that will bring Mr. Baker and the rest of us together is the salmon because the salmon has an uncanny habit on the Pacific coast of ignoring jurisdictional lines. The Idaho salmon, I am told, swims through 23 separate jurisdictions on its way to the mid Pacific, and that simply illustrates the need for all of us to be together.

The Department of Agriculture—I would simply say the relationship between Interior and Agriculture has been at the heart of many of the problems in the Pacific Northwest, and that is the real reason I think that Mike and I were out there last week. We have said to our people, our scientists, our planners, "Look. We represent the same government. We have got to clean up this train wreck, and we do it by working together with the Soil Conservation Service, with the Forest Service, and with all of the other agencies."

Mr. Chairman, I appreciate again the opportunity to be here. Thank you.

[The prepared statement of Secretary Babbitt may be found at the end of the hearing.]

The CHAIRMAN. Thank you very much, Mr. Secretary. That is music to many ears here. We like the hymnal. A terrible fate has befallen the Administrator of the Environmental Protection Agency. She is trapped in the U.S. Senate. I don't know whether to list her as threatened or endangered. We will begin the questioning and then we will withhold if and when she arrives.

If I may just begin by saying that I think both of you have done a superb job in sketching the broad outlines of the problem. It is a big one. In many respects at least, it may be the big one, and we absolutely have to resolve it. And while the outlines of the skeleton, if you will, are sort of clear, I want to see if we can put a little bit of meat on the bones. My question will take almost my five minutes to ask and will take far longer than that to answer. But let me just put it out there, and then you can deal with it as we go. You have been doing all along.

The Endangered Species Act clearly is one of the most controversial and one of the most important conservation statutes we have, but this hearing is not about the Endangered Species Act per se. As you have indicated, it is about the larger and far more important question of conserving our imperiled biological resources here and around the world.

There appear to be several themes that we all agree on. First of all, conserving that biological heritage is very important. Secondly, we are not doing a particularly good job at it, and we have got to do better. Third, the Endangered Species Act is a crucial line of defense in the battle, but it ought not to be the only line of defense because it is frequently too little and too late. Number 4: Train wrecks are bad. And number 5: We need to do more, and we need to it sooner in the process.

So how do we design a conservation program that will let us do more earlier on, and what ought to be the relationship of that program to the Endangered Species Act? And if we move to the broader ecosystem approach, which you have been talking so eloquently about, what areas are important, what kind of activities ought to be allowed in those areas, and if the important areas are not in public hands, how do we conserve them? How do we ensure that the economic costs of conservation, and there will be some, are fairly apportioned? And, finally, what ought to be the relationship between the broader ecosystem approach and the Endangered Species Act's species-by-species approach?

These are awfully complicated. They are very real. They really are at the heart of what brings the President and all of you to Portland tomorrow, and I think the way in which we answer them will have consequences for many generations to come, both for us and for our fellow critters. So, again, how ought we to design a broader conservation program, and what ought to be its relationship to the statute itself—to the Endangered Species Act? What little time is left. I know both of you sort of are very good at ruminating. Please do.

Secretary Babbitt. Mr. Chairman, I would be happy to defer to——

Secretary Espy. No. Mr. Chairman, I have to go, but it is OK.

The Chairman. That is the first question.

Secretary Babbitt. Here are a few thoughts. Obviously, there is an enormous range of issues here. The first one it seems to me—the core one is to ask what are we doing within the Federal Government? Now, that takes us back to the thoughtful management of our own land base. There is an interesting kind of pattern here. Most of the endangered species disputes—not all of them—but the vast majority of them are in the American West. The South is a fairly close second, and it is a lesser problem elsewhere. And that means that the role of Federal lands and the way we manage them has an enormous effect.

We need to remind ourselves of Section 7 of the Endangered Species Act which puts an obligation on every Federal agency—the Department of Defense, the Federal Communications Commission, all other agencies—to begin managing their regulatory functions and their physical assets in a way that comports with biodiversity. That particular section has really never been seriously discussed across the Federal Government, and I think it has enormous implications.

Number 3: We must move out toward state and local governments, and that, of course, is the singular importance of the California natural communities' conservation plan because we can't do it without state and local governments. And the reason for that simply is that the planning and zoning function that is at the heart of land use lies in those areas so we need to do that.

And, last, the issue of private lands—I think we have to proceed very carefully. I think in most cases it is possible to administer these Acts in a way that do not deprive users of the economic value of their land. I mean, that is, after all, what planning and zoning is about.

Secretary ESPY. Mr. Chairman, let me say ditto to all of that and just underscore a few things that Bruce said. I think that the Endangered Species Act has worked pretty well in identifying species at risk, but as the Secretary of Interior said before, we need to do a better job of inventorying species that might be in the way of this train coming down the track. We need to do a much better job at applying our scientists toward inventorying these species.

We have tried to do this at the USDA because we recently presented to Judge Dwyer a report that identified 667 species that exist in the old-growth forests of the Pacific Northwest so we are beginning to do this, and I think that we have to continue to do it.

The CHAIRMAN. Thanks very much. And, Secretary Babbitt, we look forward in the very near future to be able to introduce on your behalf the biological survey legislation, to get that started as soon as possible. The gentleman from Texas.

Mr. FIELDS. Thank you, Mr. Chairman. And, Secretary Babbitt, first of all, I want to applaud you for coming to Texas early and reviewing some of the problems that we have. And I appreciated some of the remarks in your testimony, particularly the comments you made about cooperation, and I want to say from the outset that this member stands ready to work with you and your department—the same thing with you, Secretary Espy.

But having said that, I hope that the statement that was made just a moment ago about being proactive doesn't mean confiscation. There is a real concern about basic property rights, and let me just tell you about a few problems that we have in Texas. I mentioned the problem in San Antonio just a moment ago, and this problem emerged because of the listing of a one-inch fountain darter. And it ultimately came about through a Federal Court decision.

The basic thrust of the decision was that an entire aquifer was declared an underground stream subject to either Federal or state jurisdiction for the first time in our law in Texas that abrogates the rules of capture, meaning that what is below your property is not necessarily yours. There could be limits placed on pumping. Your wells could be permitted. You might have to pay for the water.

Now, for someone like myself who has lived on one piece of property all my life—it has been in my family since the 1860's—I have never drunk anything but water from my water well—I feel violated, and a lot of other Texans feel the same way. I talked just a moment ago about the effects on San Antonio where, you know, there would be a $5.2 billion reduction in economic output, $3.3 billion reduction in annual income, 136,000 permanent jobs lost if this ruling stands. And thank goodness that the Circuit stayed the decision.

But I want the members of this committee to know that there are 12 other members of this committee that have the same sole source aquifer problem, and six of you have the same potential problem because of an endangered species listing so it is not just the State of Texas.

But, Mr. Espy, I want to go a little further because this decision not only affects San Antonio. I talked about the abrogation of the rule of capture and the loss of water. For farmers west of San Antonio, that means a reduction in crop. It may mean they lose family farms. For the ranchers, it means reduction in herds. It may mean the loss of ranches that have been in families for generations.

And just a little bit further—Secretary Babbitt, you mentioned Travis County in the city of Austin a moment ago, and I applaud the efforts that they have made, but that is really half the story because property owners in Travis County, Texas, have lost $359 million in property value because of the vireo and the warbler. Farmers and ranchers in that area can't cut cedar because that is the habitat of the vireo and the warbler. People who own property that have cedar on it can't sell their property. That is a real problem.

And I guess finally coming to a question, Mr. Tauzin and I have tried to come up with what we think is a sensible approach, the objective being to save species but approaching it in a rational format mandating that economic assessments be done, job loss assessments be done prior to the listing as either threatened or endangered. And in Texas, we have got 60 species already listed, but 300 are pending listing as either threatened or endangered. And if you have one on your piece of property, your property is confiscated. It is lost.

Also in our bill, we mandate that alternatives be reviewed. You know, in the case of the fountain darter, what is wrong with taking those fountain darters, breeding them, propagating, and making that the most prolific species on the planet? We can do it. Or, using the example of whooping cranes, eggs have been taken from the wild. They have been hatched in captivity, the young raised to adults, and then released back in the wild to supplement the wild population. What is wrong with that? And I want to know whether you favor compensation because if you have an endangered specie listing and you lose the economic viability of your property, to me that is a taking under the Fifth Amendment. And do you agree that there should be compensation for that loss?

And then, finally, I would like to know what your attitude is toward citizen input in the process because it appears to me what is lost in this entire Act is the ability for local farmers, ranchers, citizens, municipalities, county governments, states to have input prior to the listing that has the consequences that I have mentioned.

Secretary BABBITT. Mr. Congressman, let me say just a word about the Edwards Aquifer in San Antonio because at its core that is really not an endangered species issue. What it is, is not people versus the fountain darter, it is people versus people—specifically, the people up on top of the Edwards Aquifer, whom you will hear from today, versus the Guadalupe-Blanco River Authority, whom you will also hear from today, who are the people downstream. And, in fact, they are the Plaintiffs in the lawsuit that brought the Federal Judge in. The downstream users are saying, "We are people. We have property rights. We have an extraordinary investment specifically in San Marcos and New Braunfels in the continued flow from San Marcos Springs and Comal Springs."

I would also like to point out that John Hall, the Chairman of the Texas State Water Commission, has very correctly pointed out that this really isn't about impairing property rights. What it is, is about the lack of a water management program in San Antonio and Bexar County.

Mr. FIELDS. Mr. Secretary, are you saying this is a misapplication of endangered species?

Secretary BABBITT. Oh, no, no. I think that you are going to come to celebrate the day that the Plaintiffs invoke the Endangered Species Act in those springs. It is the best thing that ever happened to San Antonio. Now, I invite the mayor to respond to that comment, but the——

Mr. FIELDS. Mr. Secretary, I invite you to San Antonio to make that statement.

Secretary BABBITT. Well, as a matter of fact, I have. I have been there, and I have said as much.

Mr. FIELDS. I also invite you to the Texas Farm Bureau and to the Cattlemen's Association in Texas to make that statement.

Secretary BABBITT. Well, I suspect the Farm Bureau and the cattle drovers would not be as enthusiastic about my views, and the reason is that they have been at odds with the city of San Antonio about the need for a management plan because basically what this dispute is about in Austin, in the Texas legislature, in Bexar County, in San Antonio is about whether or not there will be a groundwater management plan on the Edwards Aquifer.

Mr. FIELDS. Well, do you agree——

Secretary BABBITT. And ultimately the city of San Antonio and Bexar County and Texas will all be vastly better, create more jobs, be more productive when that water management plan is in place.

Mr. FIELDS. First of all, I appreciate the Chairman's indulgence, but I have got to press, you know, one point. Do you agree that there is the potential for alternatives, and use the fountain darter as an example? Do you have a problem with taking the fountain darter from those springs, breeding and propagating, using bioscience, and making that the most prolific specie on the planet. If the objective is to save a species, we can do that without wrecking the economic viability of San Antonio and causing farmers and ranchers to lose their basic property.

Secretary BABBITT. Mr. Congressman, the species is not the problem. The lack of a water management plan, which is drying up the springs and impacting the rights of the downstream users, is the problem.

Mr. FIELDS. So you agree or disagree that alternatives can be useful, can work in situations?

Secretary BABBITT. The only practical alternative here is good water management to the benefit of everyone.

Mr. FIELDS. Mr. Chairman, I appreciate your indulgence. Thank you.

The CHAIRMAN. I thank the gentleman. Let the Chair inform everyone that all this electronical commotion you are hearing is for a vote of no consequence on the floor, but we will go in any event. And if the distinguished witnesses are able, we will grant you a 10-minute breather. Let me just remind members that under our rules, those members who were here at the beginning of the hearing will be recognized alternating by party in order of seniority. Thereafter, members will be recognized regardless of party in order of arrival. The Chair has what he believes to be a reasonably accurate list in that order and will allow people who are back here by 11:15 to requalify on said list, and the committee will resume at 11:15.

[Recess.]

The CHAIRMAN. Let us try to rearrange ourselves so that when the music stops we will determine whether or not the EPA has arrived. I gather Secretary Espy has had to go. Secretary Babbitt, if you have a deadline, feel free to let us know.

Secretary BABBITT. I am, Mr. Chairman, in pretty good shape.

The CHAIRMAN. That is wonderful. Very happy to have you here and in very good shape. And we still await, I believe, the Administrator of the EPA if and when she is released by the Senate. The gentleman from Louisiana.

Mr. TAUZIN. Thank you, Mr. Chairman. Let me first apologize for my voice. I lost it in New York, and I hope that is all I lost this week. Mr. Secretary, thanks for being here. This is not an issue that is new to Louisiana. When I first arrived in 1980, I had a visit with the Interior Secretary to make a request of him on behalf of the Cajun population I represent in southern Louisiana. The request was simple. It was a request to ask him to either get the alligators off the endangered species list or to put us on. Alligators were proliferating so fast they were eating our dogs and our children.

We also have a train wreck, perhaps more like a ship wreck, in Louisiana with the endangered sea turtles and the fishing community. We have had suicides and abandonments and bankruptcies and tragedy for the fishing families for south Louisiana as the Endangered Species Act has come in conflict with their fishing habits. We are not having a summit in Louisiana. Fishing families apparently don't have the political clout of the lumber interests in America, but they are just as severely affected.

And so it is for that reason and others that I am vitally interested in working with you. And, by the way, I am a long admirer of your no-nonsense political approach to the issues. I appreciate that. I am anxious to work with you to find some solutions. You have called for a legislative fix before the August recess. I appreciate that. I hope we can do that.

You have also called for an approach in implementation of the Endangered Species Act very similar on its face to the approach that I have taken in a bill we just filed last week which, by the way, does not—let me correct the record—require economic considerations prior to listing. It requires only biological good science before listing. It only requires consideration of all economic and socioimpacts after listing in determining which recovery plan to choose.

But under our bill, we require, as you seem to support, that communities, landowners, businesses, other would be encouraged to enter into voluntary cooperative management agreements before a species becomes threatened or endangered in an effort to set aside habitat, in an effort to identify the multispecies kind of interactive diversity, and to identify means of protecting and enhancing populations prior to entering the emergency room of the Endangered Species Act.

Can you tell me, Mr. Secretary, whether you support that type of cooperative management approach to species conservation as part and parcel of Endangered Species Act reform?

Secretary BABBITT. Mr. Congressman, just three or four thoughts. As you suggest, the American alligator is a genuine success story.

Mr. TAUZIN. It sure is.

Secretary BABBITT. I appreciate your comments. The sea turtle issue is under, as you are well aware, the National Marine Fisheries, and it seems to me what we must do is continue to cooperate, looking for the excluder technology and management that has the least impact on the shrimp fishermen—a difficult issue. I don't have an easy answer.

I appreciate your distinction between listing and postlisting. The position of this Administration has been that it is fair game to discuss how it is we handle postlisting habitat designation, voluntary plans, recovery plans, as long as we are together on science for listing.

Mr. TAUZIN. We don't disagree there, Mr. Secretary.

Secretary BABBITT. Now, with respect to the postlisting issues about habitat conservation, the participation of private landowners, incentives, the role of local governments, I think we have room for a large discussion about that. The reason I am reticent to endorse specifics is because of my feeling that under the existing Act we have the power to do almost all of that.

Mr. TAUZIN. Mr. Secretary, we only have five minutes. My question is not postlisting. My question is prior listing.

Secretary BABBITT. Prior listing—better yet.

Mr. TAUZIN. Identifying a species on its way to trouble and engaging in cooperative management agreements with landowners, businesses, with companies, with local governments, with the Federal agencies to, in fact, provide systems that prevent the emergency listing of these animals and plants and——

Secretary BABBITT. Even better. Even better. And the answer is I personally, and I believe all of my compatriots in this Administration, agree that that is the answer, that we ought to explore all of these issues. And I would only say that I think there is a lot more power to do those things right now than has ever been exercised under the Endangered Species Act.

Mr. TAUZIN. But it would certainly be good to enhance those powers?

Secretary BABBITT. I am certainly open to a discussion about that.

Mr. TAUZIN. Secondly, Mr. Fields has engaged you in somewhat of a conversation on the issue of compensation. It is an issue that troubles many, many people across America, not only here but in wetlands loss, and it is an issue that takes many landowners to Court time and time again to assert their rights. Do you believe that in reform we ought to address that issue legislatively to clearly define the rights of landowners vis-a-vis conservation efforts in endangered species or wetlands loss?

Secretary BABBITT. Mr. Congressman, I suspect that it is going to be extraordinarily difficult to write a statute which, in effect, replicates 200 years of judicial history about the constitutional rights to property that are impacted by taking so I would say only this. We are trying very hard to avoid the issue with sensible practices so that we can say to private landowners, "We are not in any circumstances depriving you of the reasonable use of your property." And in those cases where the economic use of the property has been effectively taken, what we ought to do is use the Land and Water Conservation Fund to purchase the property. And I am just not certain that I understand how we can get any closer to that in a statute.

Mr. TAUZIN. My time is up. I simply want to leave you with this thought, and that is the problem with relying upon 200 years of judicial history is that only the rich can access their way all the way to the Supreme Court to get these issues resolved, and that there seems to be some merit in us presenting to the Nation a simple, clearly defined standard by which the Courts can easily judge when a taking has occurred. That may be the subject for us to have future discussions about. I would invite your thoughts on it as we go along. Thank you, Mr. Chairman.

Secretary BABBITT. I would certainly look forward to that.

Mr. TAUZIN. Thank you, sir.

The CHAIRMAN. Following the sequence established by our magical list, the gentleman from Maryland, Mr. Gilchrest.

Mr. GILCHREST. Thank you, Mr. Chairman. Welcome, Mr. Secretary. This is an enormously complicated Pandora's Box, that when you begin to discuss it, you have to open it, and a million different things come out. I am going to ask three questions, and I know they are really relatively complicated. I think all of this is interrelated. If we talk about wetlands, or if we talk about nonpoint source pollution, or if we talk about old-growth forests, these are all interrelated, I think, and to a large degree to Endangered Species Acts.

The first question is, and I guess you don't have to answer this if you don't want to, and you are saved by the bell—in the recent Supreme Court decision Lucas v. State of South Carolina, my assessment of that particular—I mean, just the bottom line of that as far as I interpret it, as far as compensation to landowners is concerned is that if your property is taken for the public good, you should be compensated. But if your property is regulated to prevent public harm, you should not be compensated, and that, in fact, is an interpretation of the Court. My sense of this whole issue is that the U.S. Congress should not legislate something that is, in my opinion, clearly the jurisdiction of the Courts. I would just like maybe your comment on Lucas v. South Carolina.

Secretary BABBITT. Mr. Congressman, I can't improve upon your characterization of that case. I think it would take me an hour to do any better than what you just said, and even then, I might fail so I would be happy to rest with your characterization.

Mr. GILCHREST. OK. Let me go to the next one. The next question—you said earlier in your testimony that there has been 10 or 12 years of hands-off policy with the problem of old-growth forests in the Northwest and the oversimplification, I suppose, of the spotted owl controversy. I would like you to respond to that situation in two ways. If you were the Secretary of the Interior in 1980 or 1981 or 1982, what would you have done with that particular issue? And just perhaps keeping that perspective in mind, now that we are here in 1993, and you have mentioned the cooperative attitude between EPA, your department, the Department of Agriculture, and government, in general, what should we do at this point with the old-growth forests? Should part of them come down? Should they be left? Do we need a better understanding as far as educating the public about the role of the spotted owl in this situation?

Secretary BABBITT. Mr. Congressman, with respect to the first part, I really don't know what I would have done in 1980, '81, '82. I am not a very good historian. I am certain that had I been in charge of things in those days, I can tell you a couple of principles. One is Federal agencies hopefully would have been working together rather than stalling, delaying, obstructing, and tripping all over each other before a Federal Judge. Secondly, I would, at the Justice Department, have said we are never going to get this solved if we show up in anger and infuriate a Federal Judge who is a Reagan appointee and provoke him into writing opinions. Well, I will let you read the opinions. You, obviously, like to read them. They are rich with a tale of bad faith and failure.

With regard to your second question, that, of course, is the purpose of the President's trip to Portland tomorrow, and I would, obviously, defer to his leadership on this issue.

Mr. GILCHREST. Thank you. Do I still have a green light?

The CHAIRMAN. You do.

Mr. GILCHREST. Welcome, Mrs. Secretary. This is more of, I suppose, a philosophical observation of which I would like you to comment upon. When we talk about endangered species and biodiversity, we have to think of people too as far as the economy and everything else is concerned. Is there a way that the Executive Branch can help people understand that if we are talking about biodiversity, and we are talking about the ecosystem. When we are talking about prior listing of things so we don't deal with some of these train wrecks, is there a way that your agencies can begin to project the idea that if we are talking about saving endangered species and we understand that biodiversity is good for life on the planet, that we cannot separate people from biodiversity? In fact, we are all a part of the same system so if we protect biodiversity with one species, it is a benefit for biodiversity in another species and that includes us? Is that something that can be clearly projected to the American people?

Secretary BABBITT. Obviously, we haven't done a very good job of it. I would submit in the past we haven't tried very hard, and it seems to me that the approach to that is to both concretely and in a more abstract way to try to make the point that in the long run we are better off in living in sound ecosystems. In the long run there is more sustainable economic development, if we use the resource wisely, if we live a little more lightly on the land. It is better for all of us, not only aesthetically for those of us who care about those things but also in terms of our health and the economy.

The difficulty, it seems to me, is that by sitting back we drift into these confrontations when a species is spiraling toward extinction at the last minute on the last scrap of habitat which is sitting right in the way of some development project. So it is the right question, and, again, I think it is exactly the right question, and we must find better examples, more graphic and telling ways of making the point.

The CHAIRMAN. Thank you very much. We welcome Carol Browner, the Administrator of the EPA. You appear to be visibly unscathed from your visit. We are in an expansive and wonderful mood thanks to the hymn singing of your Cabinet colleagues this morning, and we will give you several options. You will notice what I believe is a snow leopard to protect and comfort you during the interrogation proceedings, and we will tell you about the shorts later. I will give you, Carol, the following options. We will hear your statement if you wish to give it now. You may simply put it in the record or summarize it if you want. You may pitch right into the questions—however you would like to proceed.

Ms. BROWNER. If the Chairman and the members of the committee wouldn't mind, I would like to deliver at least part of my statement.

The CHAIRMAN. Please.

STATEMENT OF THE HONORABLE CAROL BROWNER, ADMINISTRATOR, U.S. ENVIRONMENTAL PROTECTION AGENCY

Ms. BROWNER. Mr. Chairman and members of the subcommittee, I apologize for being late. I think one member said that it had been described that I was being held captive by the Senate. I don't know if I would say I was held "captive," but I do apologize for being held up in a Senate hearing.

I am grateful for the opportunity to appear here today, and I am particularly grateful for the opportunity to be here with my colleague, Secretary Babbitt, and I know that Secretary Espy, I think, has already been here. I think just the fact that the three of us would come here together speaks an awful lot and is an indication of this Administration's commitment to doing things a little bit differently.

I think as we all know, no single agency is given the ultimate responsibility for protecting biological diversity and natural habitat. That is, in fact, a responsibility that falls to several different agencies in part because no single law gives us all of the tools necessary to achieve those ends. We are each given different tools in the laws that we are responsible for implementing within our individual agencies.

I believe that if we are to protect and nurture these invaluable resources, that all of the relevant Federal agencies, together with state, local governments, tribes, businesses, environmentalists, and the public, will have to join hands and apply the full range of tools at our disposal.

The Environmental Protection Agency, in partnership with our fellow Federal agencies, has a vital role in protecting biological diversity in ecosystems. When EPA was established in 1970, it was premised on the perception that the environment is a single, interrelated system, and many of the laws that Congress has passed and that we now administer—the Clean Water Act, FIFRA, for example—contribute to the protection of species and ecosystems. When we were asked to control acid rain, clean up waste sites, construct sewage treatment plants, or prohibit the use of certain pesticides, these have all been actions that have helped to preserve biological diversity and natural habitat.

Yet, clearly, we all recognize that there is much more to be done. Despite our successes like reducing sulphur emissions that lead to acid rain, reducing flows of nitrogen and phosphates into surface waters, banning the use of DDT, natural habitat in this country is still seriously stressed. From the mudflats of the Pacific Northwest, to the tall grass prairies of the Midwest, to the Everglades of my own home state of Florida, natural ecosystems are under siege. And thousands of species that depend on them are stressed at best and threatened with extinction at worst.

What we are seeing in this country is happening around the world at an alarming rate. Prominent scientists now are predicting that if current rates of habitat destruction continue, as much as 20 percent of total global biodiversity may be extinct within the next 30 years. Because of the ongoing degradation of natural systems in this country, at EPA we are trying to think a little bit differently about how we do our job. We are trying to place more emphasis on the protection of habitat, both for its own sake and because of the role it plays in protecting the quality of human life.

EPA's Science Advisory Board's 1990 report, "Reducing Risk" recommendations are based on a belief that ecosystems and the biological diversity they support have an intrinsic value beyond their direct utility to humans. As the Science Advisory Board wrote in their report, "There is no doubt that over time the quality of human life declines as the quality of natural ecosystems declines." The health of humans and the health of ecosystems are inextricably linked.

There are many opportunities for us at EPA to foster the health of ecosystems. We have established the Environmental Monitoring and Assessment Program in an effort to measure trends in the health of ecosystems and anticipate emerging threats. We look forward to working with the Department of Interior in their efforts as they seek to bring together all of the responsibilities that they have and then to look at how we can best interact with that and how we can make sure that all of our resources are being put to their best use.

In addition, we have undertaken several initiatives targeted at specific geographic areas focusing on systems such as the Gulf of Mexico, Chesapeake Bay, and the Great Lakes. It was with great honor yesterday that I signed the Great Lakes Water Quality Initiative. This was an effort that had been ongoing in the agency for almost two years looking at the Great Lakes, working with all of the parties affected by decisions that will need to be made by procedures that will need to be implemented to protect the Great Lakes.

More than 100 public meetings were held in the region, and we have now put forth a very comprehensive proposal to solve the issues facing the Great Lakes. And we are eliciting comments and are hopeful that we will get a large number of comments, both on the actual proposals included in the initiative and also the process by which we were able to put together this product, because it is a process that we would look forward to using in an increased way in the future as we deal with other ecosystems and watersheds.

The Clean Water Act also allows for the designation of outstanding natural resource waters of exceptional ecological significance which then allows us to apply special protections. In the National Estuary Program—something that I worked on when I was in my former role in Florida—we actually worked with local communities, with the Federal Government, state, citizens to develop a plan to restore and enhance watersheds, and estuaries that had been previously impacted, and got lots of community participation, and what the appropriate solutions were based on how people lived their lives in that particular part of the country or the state.

These initiatives and others like them involve partnerships among Federal agencies, state and local governments, and nongovernmental organizations at the ecosystem level. They can benefit immensely from the coordinated support of strength and leadership of the Federal agencies here today, and I think that is something that we all recognize in our individual agencies. It is something that this Administration—the Clinton/Gore Administration—is absolutely committed to—a coordinated approach. I don't think we have seen this level of coordination at the top level of agencies previously. I think it is something new we bring to the Administration of government and something that we are all extremely committed to.

In addition, we are developing a process for assessing ecological risks much like the process we use for assessing human health risks. Ecological risk assessment will help us identify problems, set priorities, and provide a scientific basis for decisions. While not an exact science, ecological risk assessment will help formalize ecosystem concerns throughout EPA. We will review EPA programs for further opportunities to develop strategic options for protecting species and habitat in the course of carrying out our statutory responsibilities. We will find ways for EPA offices, both here in Washington and in the regions, to incorporate ecological components into their ongoing programs. Perhaps most important, we will identify opportunities for cooperation with other Federal agencies, state government, and private organizations.

Interagency cooperation, Federal/state cooperation, and public/private cooperation are essential to our national effort to preserve habitat and nurture biodiversity. All of us have responsibilities that pertain to ecosystem protection. All of us have tools that can be used for that end. To be successful, we have to coordinate our actions, leverage our resources, and combine our expertise in ways that are most effective for specific ecosystems. While I am Administrator of the Environmental Protection Agency, that is exactly what I intend to do.

This new approach should be the linchpin of national policy regarding biological resources, and I appreciate this committee's interest in these issues and the Chairman's commitment to working with us on these issues so that we can do the very best job possible.

[The prepared statement of Ms. Browner may be found at the end of the hearing.]

The CHAIRMAN. Thanks very much, and your whole statement will appear in the record. The gentlewoman from Washington, Mrs. Unsoeld.

Mrs. UNSOELD. Thank you, Mr. Chairman. The words of the three of you today have been as beautiful as the music of a bubbling brook, but we all know that downstream is the roar and the fury of a waterfall. I have one question that I would not expect an answer today but perhaps sometime in the future. Is there any built-in way of ensuring both intra and interagency coordination, or is it only through the leadership of the person in the White House? And after you have more experience, I would appreciate a response on that. Oh, you want to jump in today?

Ms. BROWNER. I don't mind responding today.

Mrs. UNSOELD. All right. Sure.

Ms. BROWNER. You can start.

Secretary BABBITT. Well, I would only say we are doing a lot of talking about this. It is exactly the right question, and we are spending a lot of time sitting around fireplaces and restaurants and stuff talking about it. The fireplace is in my office.

Ms. BROWNER. It was not lit. We wouldn't want to contribute to air quality problems.

I think that there are some vehicles that exist. I think leadership is absolutely essential, but there are vehicles that exist—memos of understanding, memos of agreement that can be signed between agencies. In fact, there are divisions within my agency and within Secretary Babbitt's that already have such agreements. They create both a process for coming to an understanding and then for memorializing that understanding and using it for future decisionmaking.

I think the challenge for us and the challenge that we wholeheartedly accept is to look for other such opportunities and to expand it beyond the narrow places where it presently exists.

Mrs. UNSOELD. Thank you. Mr. Secretary, you very ably described in a couple of specific incidences that the criticisms that are often aimed at the Endangered Species Act are really the results of the failure of other management practices, but in the Act there is mention of an ecosystem approach to managing our resources. Yet, there are few specifics on how we accomplish an ecosystem approach, and is there a way to incorporate some of that and some of the prevention side into the Act? Again, this may be premature, but as your thinking on it develops, I think it would be very, very useful for those of us who are also grappling with the issue.

Secretary **Babbitt**. Right. It is an important question, and as I intimated earlier, I think there is an enormous implicit power in the Act because the threat for the eventuality of listing and the specter of all these train wrecks, I think, is increasingly getting people interested in saying, "Can we devise a substitute in the form of an advanced habitat conservation plan?" What we really need or what I most need is some experience reaching out with states and local governments.

California, who has been the genuine leader on this—they are truly quite extraordinary. There are 20 or 30 advanced habitat conservation plans being worked out in California through state/local. There is a very interesting state/local/Federal one going now in the southern part of the San Joaquin Valley, for example. If we can get a little more experience with these, I think we will have a base to come back and say, "Here are our specific suggestions as to what you might do to further this process," with some specifics in a revised Act.

Ms. **Browner**. Well, I would say the challenge for us at EPA is to take the regulatory tools that we have and think about applying them, I think, in a slightly different way. Two points. First of all, we operate under a variety of separate laws. There is the Clean Air Act, Clean Water Act. What we have to be able to do is look cross-media. We cannot continue to just look narrowly and say, "Well, here is what we are doing for the air, and here is what we are doing for the water."

One of the best ways for us to start that process of looking cross-media is to look at systems and to look at how you protect the system in its entirety and how you develop standards that are specific to that system. I think as we all know, there will be standards that work in one instance and that meet the goals of protecting the system that don't perhaps work in another instance. So we have to move beyond the narrow confines of the individual laws.

A lot has been achieved through these individual laws in terms of environmental protection, but we have to start to move to a new way of thinking about it. We have to move upstream to prevent pollution from occurring in the first place, and that, I think, is the challenge of environmental protection in the '90's.

Mrs. **Unsoeld**. Mr. Chairman, I would just like to conclude with an expression of appreciation to the Administration and to all of you who are about to journey to the Northwest to help us find resolution to this issue that has plagued us for some years and for which we in the Northwest are incapable of arriving at a solution—we need the leadership that is coming out of the White House to bring the agencies, to bring the people together. And if it helps you as you are out there undergoing what I know some of tomorrow will this will be a microcosm of how all of these issues will be viewed and addressed in the future. So thank you so very, very much for what you are doing for us.

The **Chairman**. Just to advise members of procedure, the Chair is going to continue in this round in the order in which members were initially here, following our normal procedure. Unless and until either Ms. Browner or Secretary Babbitt must leave, it is our intention to continue through, regardless of the hour and regardless of votes. We will, obviously, pause for any votes, but we will not pause for lunch. We will simply proceed so members may plan accordingly until either all time or all members have expired.

Mr. LAUGHLIN. Mr. Chairman?

The CHAIRMAN. The gentleman from Texas. Does the gentleman have a question?

Mr. LAUGHLIN. I misunderstood. I didn't hear clearly what you said about Secretary Babbitt. Did you say you——

The CHAIRMAN. He is looking very hardy and strong at the moment, but as long as he lasts, we are going to proceed.

Mr. LAUGHLIN. He is not getting ready to leave then?

The CHAIRMAN. It doesn't look like it.

Secretary BABBITT. After that question, no.

The CHAIRMAN. The gentlewoman from California, Ms. Eshoo.

Ms. ESHOO. Thank you, Mr. Chairman, and also for your eloquent introductory comments this morning. Mr. Secretary and Administrator Browner, it really is a privilege to be in the same room with you and to be working with you. As I was listening to both of your introductory comments, I couldn't help but think of my two young adult children who, besides being excited about their mother being elected to Congress, were absolutely thrilled about your serving in the Administration. And I think that that says a lot about the hopefulness of this country and the stewardship and the leadership that you have been known to give before and will continue to give, and I really could not mean that more.

Congresswoman Unsoeld brought something up that I want to follow up on, and, Mr. Secretary and Administrator Browner, you also spoke to it, and that is the need to be proactive. In many ways, we are now entering into a new chapter of our stewardship, what we have learned earlier, the good laws that have been placed on the book, and how we can strengthen them. As you move together as a team, thank goodness, because you all are coming from the same place in terms of values, can you talk about how you might develop that plan of proactivity?

I would like to make an offer to you as well, Secretary Babbitt, that we, in the San Francisco Bay Area, specifically in San Mateo County, were one of the first HCP's to be put together, and it was out of a great deal of anguish. But that is working and working well, and if we can offer that to you as a model that you can learn from, I invite you to come meet with the people in San Mateo County. There is now some affordable housing. There is a state and a county park, the first in the history of the state, and a habitat conservation plan that is protecting a very beautiful butterfly. So I invite you to do that.

But if you have any ideas about how you might proactively develop a plan, it would be interesting to hear about it. And I would like to work with you to help to develop that also.

Secretary BABBITT. Just a couple of thoughts. The San Bruno Mountain/San Mateo HCP was, in fact, to my knowledge, the very first——

Ms. ESHOO. First in the country.

Secretary BABBITT [continuing]. example of this ever done. You are going to hear a little later from John Sawhill from the Nature

Conservancy, and I am sure that he will be talking about this advanced process which was really pioneered by the Nature Conservancy back in the 1970's in cooperation with state fish and game agencies. Their terminology is Heritage Program.

The importance of that precedent is that to be proactive we really need information. We must have a systematic sort of process in this country involving states, localities, and universities to assay, if you will, the biodiversity of each ecosystem and to get this information up in geographic information systems which will allow us to see the reality, and I think it is the ultimate form of proactive—is to get these surveys up and do this gap analysis—and from that enable each unit of government, developers, and all others the maximum flexibility. And that, of course, is the reason that this process going on in southern California with the gnatcatcher is so important because it involves all of these people—developers, and the local governments. And I think that is the ultimate objective.

Ms. Browner. I might just add that I think there are real opportunities and sometimes we don't see them in the regulatory form to become proactive. I will share an example of something that I did in my regulatory position in Florida relating to wetlands. Walt Disney World was interested in a 20-year wetland dredge and fill permit—a 20-year buildout of all of their properties. And rather than using traditional wetland mitigation where they would have created sites sort of all over their property, we suggested that, "Let us do something that we know is going to be meaningful in terms of ecosystem protection for the long-term and work together with Walt Disney and the Nature Conservancy in Florida to preserve what started out as 8,000 acres of previously impacted wetlands that will now be restored as a functioning ecosystem."

And the state now is in the process of going to others who seek wetland permits in that same watershed and say, "Rather than do some little acre here that we can't assure future productivity, participate in this broader effort," and eventually what can happen in these sort of settings is that you can take something that started as mitigation and can become a wildlife corridor to some of our parks and some of our other habitats that we seek to protect. And you can have an integration of the type of work that Secretary Babbitt is talking about and the regulatory side of the environmental protection equation. You can bring them together in a way that has meaning for the future.

Ms. Eshoo. Thank you.

The Chairman. The gentlewoman from Washington, Ms. Cantwell.

Ms. Cantwell. Thank you, Mr. Chairman. I very much appreciate both Secretary Babbitt and Administrator Browner being here. I am sorry that Secretary Espy had to leave. We certainly do appreciate the Administration's attention to this issue as it relates to the Northwest. So many of our communities have felt like political footballs on a national debate, and I certainly feel it is time to give a real focused approach, not just to how we address the issue but how we address economic assistance once we make our decisions.

I guess my question comes in coordination of both the results of the Forest Conference and the reauthorization of the Endangered Species Act and exactly how in the Administration's view you see those two things fitting together as far as timing and response? And what about adding a notion of economic assistance after you have made these decisions so impacted communities can rely on some help and coordination from the Federal Government and from, obviously, other agencies in a more coordinated approach?

Secretary BABBITT. Congresswoman, I really think that what the Forest Conference tomorrow is all about and that the President will be in the wake of that conference getting us together to answer those questions. I think it would be premature for me to speculate about exactly what that pathway is going to look like, but I would suggest that if you were to ask that question of this Administration in 30 days, you will see the results of that conference.

Ms. BROWNER. I want to speak more specifically to the point that you raise about commitment of resources. This Administration, this President has made a commitment in his long-term economic investment package to help meet the needs of local communities as they come into compliance with things such as the Clean Water Act requirements, the Safe Drinking Water Act requirements. I think that in an Administration where so many of us come from state and local government, we have an all too keen awareness of the increasing responsibilities that have been placed, particularly me in the regulatory arena, on local government, on state government, and we are very sensitive and very committed to trying to help those communities meet those goals that we have set and provide them with the economic tools to do that.

Ms. CANTWELL. Do you think that should be a more formalized process in the Endangered Species Act, I mean, after decisions have been made so that the assistance there is guaranteed?

Ms. BROWNER. I will leave that for the Secretary of Interior.

Ms. CANTWELL. I may have heard his answer, and that is wait 30 days. But I wanted to bring up the point—it is so vital. These communities have been held hostage because a decision hasn't been made, and yet I think that there could have been some things done at the Federal level that would have been of great assistance in the area of training and education which the state has already stepped up to. Thank you.

The CHAIRMAN. The gentleman from Kentucky was, indeed, here at the beginning so we will recognize him.

Mr. BARLOW. Thank you very much, Mr. Chairman. Ms. Browner, thank you for coming over today. I know that you are just getting into your work there at EPA, and already I have seen a few articles in the newspaper of your reactions to what you are presented with in the administration of the agency.

And I would like to say that from a standpoint of Western Kentucky, we are very sensitive to EPA in our small business community. There seems to be a lack of organization within EPA and a lack of coordination with the state Departments of Natural Resources to the point that our small businesses keep being brought under fire from all directions. And there almost seems to be a regional attitude within EPA and also the state DNRs of, "Let us land on someone and get into kind of a competitiveness situation—who can wear down that small business the most," and coming back time and again. What starts out as one investigation turns into multiple investigations by numbers of agencies and numbers of personnel that stretch over a couple of years.

Small companies don't have the financial resources to put up with this, and some of the prescriptions that are laid down run way beyond just in terms of dollars what started out as the initial problem. There is a capriciousness here. There is a witch-hunt approach when the people drive in the driveway to the small business. Sometimes there is—what comes up is new, younger people come into administrative slots in EPA regional offices, and they pull out files and start all over again, and the approach is, "Let us see what we can find out, and let us see how many scalps we can nail on the wall here."

Having been on all sides of these issues myself, are there simple, practical methodologies that might be devised where a business that wants to do right can be put on notice that they are up for review, and then have a quick review, and then a list of particulars sent to that business, and then that business, assuming they do a good faith effort at performing the prescription, the agency is going to let them off the hook for a period of time and not come back and haunt them? I am just putting that out as a statement as much as a question and don't really need an answer to it, but if you choose to——

Ms. BROWNER. Well, I would be more than happy to at least discuss this with you a little bit. You are right. There is a burden being placed on small business that, in many instances, is somewhat extreme. Part of the confusion, I think, is twofold. One, we have a number of government agencies—Federal, state, and local—who are all interested in being environmental stewards, who are interested in making sure that environmental rules and regulations are being complied with.

Sometimes these various levels of government find themselves at cross-purposes. We, at EPA, need to do a better job of delegating programs to states who have the capacity to assume that responsibility, letting them take over and integrate our program into whatever their program is. I know from my experience at the state level that state governments also need to do a better job of working with local governments. What we can do is ultimately maximize the use of all of the resources that are currently available for environmental protection. I mean, in California, just by way of example, the South Coast California Air Quality Board has more people working on air in one part of the one state than EPA has in the country, and what we need to do is make sure that we are getting the most efficient use of the resources, that we are not duplicating efforts.

The second point that I would make is that we need to, and sometimes the statutes don't always work in this way and so we need to make the Congress aware when there are one of these problems, but we need to move toward what we call cross-media enforcement so you don't have your air person going out one month and then your waste person coming out the next month. That one inspector goes out and looks at all of these—is trained to look at all of these. Now, sometimes this doesn't work because we have requirements to inspect some things on a different schedule than other things, but we need to try and bring that whole inspection process into a coordinated manner, and we need to involve state and local government.

Mr. BARLOW. Your second answer there, I certainly support that and anything we can do to help.

Ms. BROWNER. OK. Thank you.

Mr. BARLOW. Thank you, Mr. Chairman.

The CHAIRMAN. The gentlewoman from Arkansas.

Ms. LAMBERT. Thank you, Mr. Chairman, certainly for not procrastinating, and pulling all of us together on this important issue. I certainly share the excitement of my colleagues in seeing the collaboration between the three agencies here. Your willingness to work together to come up with a balanced solution to the problems that we have seen escalate in recent years is tremendously important, and we applaud your activities and your energy.

I am sorry to see that Secretary Espy is gone. He is a neighbor just to the east of me in my district in eastern Arkansas where we are dependent on agriculture and farming. It is an important industry to say the least. It is the basis of our economy, and it is important to me because I come from a seventh generation farm family.

It concerns me that the friction that has been there between agricultural production and the idea that there is not an environmental sense among farmers and agricultural producers. I probably would be safe in saying that one of the biggest environmentalists I have ever known is my father who has depended solely on the land to provide for his family.

In particular, I would like to ask just two questions, the first being the impact that the species has on that landowner? Property rights are very important, and I would like to know what your comments would be and what the law would allow for property rights and compensation to property owners? I think that is a very important issue for us in the farming community.

And the other would certainly be this: the law currently says that no person, public or private, may take a listed species. What is the interpretation of that word "take" by regulators and how do you see that playing out in the future?

Secretary BABBITT. What comes to mind specifically is a western issue, not really a southern one, and that is the use of rangeland for grazing. Now, in almost every case where we have constructed these habitat conservation plans, we have been able to adjust the plan to be consistent with the economic use of the land. And I think that in almost all cases that is possible because a good conservation plan ought to be consistent with the kind of quality agriculture that you talk about.

And we are now looking at actually using a regulatory mechanism—that is, the lease fees on western lands—to strengthen that process by saying to ranchers, "We will discount the rate you pay for the land, the lease fee, by a substantial amount in exchange for meeting agreed targets for good land management." So, in effect, we have created a positive economic incentive quite to the contrary of subtracting. I think what we are doing is adding.

Now, in those rare cases where there is a genuine head-on conflict, then we have to look to the issue of using the Land and Water

Fund to acquire the property or adjusting the plan to make up for it somewhere else.

Ms. LAMBERT. In ensuring that there is just compensation?

Secretary BABBITT. Yes, but I don't want to emphasize that because I think those conflicts are very rare, and they need not occur if we have proactive management and have enough options to adjust the plans and spot the problem early.

Ms. LAMBERT. Well, I think that it is very interesting to see that you are going to see a lot of cooperation in the proactive. I think you will most definitely because farming has always been a long-term project. I mean, it is something that you maintain your livelihood and your heritage on. So we—I say we because I am a farmer, but the farming industry too has that long-term importance, and I think that there is definitely something we can share. And as Administrator Browner commented, working together and finding the common ground that we can use is going to be very important.

Secretary BABBITT. I certainly agree with that.

The CHAIRMAN. The gentleman from Texas, Mr. Laughlin.

Mr. LAUGHLIN. Thank you, Mr. Chairman. Secretary Babbitt and Administrator Browner, I would like to say something to you taken somewhat from the words of the gentleman from College Station, Texas, Mr. Fields, about the effective taking of property, and it is a very real problem in the minds of many people in rural America. The area I represent is a very large rural district in central Texas all the way to the Gulf of Mexico, and in that area when I was a kid when they talked about "they," they were talking about Communists, the IRS, and the KGB and people like that. Now, when they talk about "they taking our property," they are talking about your agency and your department and the Fish and Wildlife so hopefully your groups will work together in resolving the effective taking of private property that has been in the hands of some of these families for many generations.

And it is not just that their name has been on the title at the Courthouse, they have been paying taxes on it, and they have been managing it and preserving it and caring for it. So I hope that you will show that same spirit of cooperation that you are showing today in resolving this because I am sensing a backlash in the treatment of the environment that can become real if we don't address that.

Secretary Babbitt, when you were talking about the Balcones Wildlife Refuge, you very accurately described it being in Congressman Pickle's district up until redistricting. I wish it was all still in his district.

Secretary BABBITT. Here is where I won't have any response at all to that.

Mr. LAUGHLIN. I have told the Congressman he could have it back, but the legislature won't let us do that. What I want to get to is I want to clarify what I thought I heard you saying not only about that refuge system but I want to clarify what I thought you were saying. Did you say to us earlier today that in these areas of critical habitat that have been identified as critical to endangered species that there needs to be a balanced plan, a plan where human beings can continue to live and develop those areas in conjunction with the habitat?

And the point I want to make is in that area, using the Balcones area as an example, we are talking about just raw land for many square miles, and it would occur to me that if you had a balanced plan that you could have homes and desirable development at the same time protecting the habitat. Is that what you were saying, or is that in the plans of your department?

Secretary BABBITT. Yes, sir. I think that is accurate. I think that the Balcones Canyonland project is especially interesting because in those areas where it has been determined principally by Travis County and Austin that all land ought to be preserved, there is a bond issue to buy it. In other areas where there are these development tracks, there has been a tradeoff process worked out with the developers which, in effect, says, "Sure. There ought to be some development, and we will grant these development rights in exchange for a tradeoff of exactly the type that you describe," so I think the answer is yes.

Mr. LAUGHLIN. Well, you certainly would, I think, encourage more support for this plan if that message were out there in a stronger manner, and certainly there has been substantial jobs either lost or put on hold because of that message in there, or, better, there is no plan that has been implemented, and I would certainly encourage that to happen.

Administrator Browner, I don't know that you need to answer this, but I certainly want to make the observation to you I applaud your efforts in the Senate today talking about the Great Lakes, but I would point out to you the EPA has done very little, and I underscore very little, in the four years I have been in Congress dealing with the Gulf of Mexico. And you all have had substantial plans in the Chesapeake Bay and the Great Lakes spending hundreds of millions of dollars, and you can fit all the Great Lakes and the Chesapeake Bay inside the Gulf of Mexico at least two times and have space left over.

And about 80 percent of the waterfowl that migrate during the wintertime have the Gulf of Mexico region from Florida to Texas and on south as their habitat. Some 95 percent of the shellfish have some part of their life cycle there. The second largest source of money for our Federal Government comes from the Gulf of Mexico. Yet, your agency, and this goes back at least the four years I have been here and that predates you in that position, have ignored the Gulf of Mexico. What assurance can you give us, and I will tell you I am introducing a bill in the near future to help address that——

Ms. BROWNER. Probably the best assurance I can give you is that I was born and raised in Florida, and I spent a lot of my summers on the Gulf of Mexico. I share your concern for the resource. I recognize the significance of that resource and am looking forward to making sure that EPA does everything it possibly can to protect the Gulf of Mexico, the jobs, the habitat that it provides.

Mr. LAUGHLIN. That is good assurance. Thank you very much. Thank you, Mr. Chairman.

The CHAIRMAN. Isn't this more fun than the Senate?

Ms. BROWNER. Yes.

The CHAIRMAN. The gentleman from California, Mr. Hamburg.

Mr. HAMBURG. Thank you very much, Mr. Chairman. And Administrator Browner and Secretary Babbitt, thank you very much for being here this morning. It was great to have you out in northern California, Mr. Secretary, and I know that you absorbed a lot of information out there, and you have heard some of the real stories that people are telling out there and have been telling for many years. And one of the reasons that that story is such a sad one is because of the issues we are discussing this morning, the lack of coordination among agencies at the Federal level and the problems between Federal and state agencies.

I think it is important to remember that, indeed, one of the endangered groups on the north coast and throughout the Pacific Northwest is people who work in resource-related industries. Our loggers are an endangered species. Our fisherfolk are an endangered species. Native Americans who depend on the salmon fishery for their subsistence are endangered by our lack of foresight, our lack of dealing with this issue proactively, and I really appreciate the talk about getting ahead of the curve. I think that is something we call all really hear and be thankful to be hearing.

The problem though, I think, in my area of the north coast of California is that we are now so far behind the curve. There is a tremendous amount of catch-up that has to be played here in order to get into a proactive mode. And one of the areas that I have a lot of concern about, and I know this will be discussed in Portland, but I would just like to get your feeling on it, speaking about the ancient forests of the Pacific Northwest, most observers of the situation would say that there are only five to ten percent of the original ancient forests of the Pacific Northwest including northern California left.

Do you feel that preservation of this last amount of ancient forest and the biological diversity, the biological values that are represented there call for preservation? Are you looking for legislation from our body and from the Senate to preserve this last heritage that we have in my area of the country?

Secretary BABBITT. Congressman, I really think the answers to those questions ought to await the conclusion of the Forest Conference. I can avow to you that the President will, after that conference, come back and formulate a policy, give us our marching instructions, and that we will be back in due course, I think sooner rather than later, to execute his plan. But in the meantime, I would respectfully defer a direct response.

I would add one thing. This issue of interagency work is especially interesting in your area of northern California. We had occasion to begin looking at the Klamath River Basin after my visit, and it is really quite extraordinary because I find that the problem there is precipitated by the Bureau of Indian Affairs. The big problem on the top of the river is a reclamation project run across the border in Oregon by the Bureau of Reclamation. The forest practices are on the ONC lands run by the Bureau of Land Management along the stream.

The Fish and Wildlife Service is running a hatchery which was designed to mitigate for the effects of the Bureau of Reclamation project, and it has been a fairly dubious relationship because the Bureau of Reclamation persists in water management practices which seem to be frustrating the mitigation that was intended by the Fish and Wildlife Service. And the United States Geological Survey enters with a water assessment program that doesn't seem to be clearly focused on any of these things all of which is a way of saying we have got a lot to do, and I think we can do it.

Mr. HAMBURG. Mr. Secretary, if I could ask—Ms. Browner, did you want to mention anything with respect to that?

Ms. BROWNER. No. I was just saying in addition to what Secretary Babbitt said, that is one department. No doubt we will find that EPA probably is also not contributing to the solution of the problem in a way that is most effective for the people and the system there.

Mr. HAMBURG. Well, the EPA currently has its own headache out there with respect to the closure of a Simpson pulp mill and the way in which that was done. I don't know if that has gotten to your desk yet, and I hope it won't. I hope we will resolve it at the regional level. I also wanted to ask a question about enforcement. It often seems to me that at both the state and Federal level we have a lot of laws on the books. Some of those laws are very good laws. They call for proper regulation and a holistic kind of approach, but the problem often is enforcement.

And I think with respect to the Endangered Species Act, one of the things that is holding back its effectiveness is the lack of dollars for enforcing the Act, the lack of people out in the field, the lack of resources to create habitat recovery plans. I would just like you to comment on the budget for enforcement of the Act and what you would like to see the Congress do.

Secretary BABBITT. Congressman, I need more budget money period.

Ms. BROWNER. So do I.

Secretary BABBITT. No. Seriously, we have, with respect to the Fish and Wildlife Service component of our baseline budget, expanded quite substantially the share allocated to the Fish and Wildlife Service. I would also while I have the opportunity say that I have carried your concerns about the specific enforcement issues in Humboldt County relating to the redwood forests——

Mr. HAMBURG. Thank you.

Secretary BABBITT [continuing]. to the Fish and Wildlife Service, and it will be looked at.

Mr. HAMBURG. Thank you.

The CHAIRMAN. The gentleman from Pennsylvania.

Mr. WELDON. Thank you, Mr. Chairman. And, Mr. Secretary, it is a pleasure and honor to have you here as it is Administrator Browner. I apologize for not being here for your testimony. We have a number of hearings going on this morning as is also the case for a number of other members. I welcome your attendance and look forward to working with each of you.

One of my concerns relates to my background. Before coming to Congress, I served as a county commissioner, a mayor of a town, and county commissioner of a county of 600,000 in suburban Philadelphia. I currently represent portions of three of the largest counties that border the city of Philadelphia. We have tremendous development pressures, as you can imagine, as the population is leaving the city and moving out to the suburbs, and with that come all the problems that are being raised here today.

Having been the Chairman of the Board of Commissioners of a county of 600,000, I realize that many times we don't consider the very positive and successful things that are being done locally. In fact, in many ways, what is being done is far better in addressing problems, like those relating to endangered species and biodiversity, what we think can only be solved here, within the Beltway in Washington.

I want to specifically talk about one of the three counties that I now represent. I only represent a very small part of Chester County, which is Andrew Wyeth's home county, a county of about 500,000 people, a very Republican county, and one that you might not think of would be very much concerned about biodiversity and endangered species. I happen to be a Republican who feels very strongly about these issues.

Chester County, in 1989 without any prodding from the Federal Government or state government, passed a $50 million bond issue with 88 percent of the voters in the county support. The bond deals specifically with preservation of open space, parklands, and looking at ways to entice local governments to preserving their open space in connection with the protection of both endangered species and biodiversity.

In fact, right now they have a major study underway in cooperation with the Nature Conservancy, the National Park Service, and their own county parks and recreation department to do the planning. Only 15 of the 73 municipalities in Chester County have not developed local land management plans that are consistent with this countywide effort. My point is why can't we use examples of these success stories; especially when we hear so much about the train wrecks, a phrase that has been used probably 15 times in this morning's hearings. We are going to have a train wreck coming, a train wreck here.

Why don't we use the positive examples and lessons learned across America, where Republican and Democratic counties are doing a very good and effective job protecting biodiversity and endangered species. They are doing this, not because of anything we are doing down here, but because it is the right thing to do. We need to find a way to get those stories out and create incentives for those counties to continue to expand their programs. We must also urge them to develop incentives for the local municipalities to use the same management plan and considerations.

Are there are any things that you can do? I think this statement is consistent with what I heard you speaking. It is consistent with what I think your approach will be. But if there is one thing that I could impress upon you that would be my statement to you today—we need to find ways of showing that we can work with the problem of endangered species and biodiversity in a very positive way. It doesn't have to be an onerous or a negative situation. As is the example of Chester County, which is predominantly a farming county. They have, in fact, taken thousands of acres of farmland now and have preserved them in line with the kinds of priorities that we are talking about here today. My suggestion to you is to focus on these success stories and incorporate them unto your discussion on biodiversity and endangered species protection.

Secretary BABBITT. Mr. Congressman, I accept your admonition, and I agree a thousand percent that this issue must, in the final analysis, be a local issue for one simple reason: Endangered species and biodiversity are about habitat. Habitat is about land. The use and regulation of land is in American history, in the American legal system a function of local governments, and when push comes to shove, it takes us back to the willingness of local governments. And, as you say, there have been some extraordinary manifestations of that willingness. Ms. Browner's State of Florida is another extraordinary example of communities generally voting against all revenue increases of every kind without exception, again and again and again passing bond issues for local open space acquisition for precisely these purposes.

I would add just one other thing. As you refer to, the role of the Nature Conservancy in this movement is without parallel in American history, and I think we should, in recognizing that, invite them to continue in the midst of this dialog.

The CHAIRMAN. I thank the gentleman. As I understand it, Ms. Browner, you are compelled to leave at this point. Is that correct?

Ms. BROWNER. Shortly.

The CHAIRMAN. Well, either of you please raise your right hand at anytime that you have to go. The gentleman from Texas, Mr. Green.

Mr. GREEN. Thank you, Mr. Chairman. I appreciate the opportunity to discuss it this morning. In case the Secretary and Ms. Browner haven't known, the whole Texas coast except for Jack Brooks is represented on this committee, and Jack Brooks has never been hesitant at all about telling us or anyone else what he feels about. So I would echo what Congressman Laughlin has said concerning the emphasis on the Gulf of Mexico, and we have had some great experiences with joint use, both jobs and also recreational facilities in the Gulf of Mexico. The best fishing in the Gulf is at the base of some of the oil platforms that I keep hearing about from my sportsman.

And also to talk about the comparison with what we have in the Gulf as compared to the East Coast. And the Galveston Bay effort—and I know Congressman Fields is familiar with the effort that we are trying to do on the Galveston Bay—similar to what is being done in Chesapeake Bay. Galveston Bay has an estuary system that is second only to the Chesapeake Bay, and we would like to see the continued cooperation and even more so of our efforts to have that joint use.

Of course we also have the third largest port in the Nation going through that Galveston Bay so I has to be a joint use, but for recreational purposes, for habitat, it is so important. An I am particularly glad to have the Secretary talk this morning about the example of west of Austin. I think the first time I met you, Mr. Secretary, was in a law office in Austin a few years ago when I was in the legislature, and in that experience of that joint use of both having the jobs but also the habitat for the endangered species are examples that we can use all over the country particularly.

Ms. Browner, I represent the industrial area of Houston, the Port of Houston. I just wish we could divide all the land wealth into my district. We wouldn't have one of the poorest districts in Texas because we have a great many refineries and petrochemical facilities. So, obviously, we are interested in the EPA efforts in cooperation with our local state agencies and even local agencies over the years. I have had experience in serving in the legislature, and the quickest response we could get would not be from the EPA and not necessarily from state agency much to my concern as a legislator but from our local Harris County Pollution Control people when we had a problem. So I appreciate the cooperation and hopefully even more so in industrial areas like we have in the Houston area but also realizing we can have a win-win situation with what you have talked about so thank you for being here.

The CHAIRMAN. The Chair wants to acknowledge the gray area in which the gentleman from New York, Mr. Hochbrueckner, falls here. He was here at the beginning, but he was not here immediately at the resumption, and our rules don't cover the situation. I will observe that next would have been the gentleman from New Jersey, Mr. Hughes, who left saying he was going to return, but he did take his shorts with him. All things considered, I think it is only fair to recognize the gentleman from New York.

Mr. HOCHBRUECKNER. Thank you, Mr. Chairman, and I will take my shorts with me also. And we are all complimented by the fact that they are small which is very, you know—unfortunately, they won't fit, but we will find someone who will be a worthy recipient. Thank you, Mr. Chairman. Administrator Browner, first off, I would like to thank you for something. In this business, there are very few thank yous, but let me thank you publicly. Peconic Bay, which is the bay between the north and south forks of Long Island, has achieved the unique distinction of now being the 18th body of water in the National Estuary Program. There was a problem with the funding. You came through, and I want to thank you publicly for supporting our bay, and it is very important to its recovery.

Secondly, actually for both of you, I would just like to point something out. I don't really have a question, but if you look at this year's budget, it turns out that there are really three pots of money for environmental restoration. The Department of Energy has 6.2 billion requested, and the Department of Defense has 5.5 billion requested, and Super Fund—I am not sure what the number will be—I assume it is somewhere around $2 billion—so there will be available this year in the neighborhood of 13 to $14 billion of funds for environmental restoration.

Now, certainly millions of that will be spent on research and development programs that I think are very important and also in the $38 billion, which will be in the research and development portion of the Defense budget this year, there will be many programs that we will work to dedicate toward environmental restoration technologies and processes. And clearly under the President's dual-use interest where we are investing military money to produce technologies and products and processes that, in fact, have a commercial spinoff, obviously, for the jobs and the interest on the part of the Administration which I applaud and support, there will be many opportunities for these dual-use technologies to be available.

So what I would suggest to you, and I applaud you for the cooperative effort that you are already showing between the agencies in order to put things together and make things work as opposed to the contrariness that has existed in the past, I would also like to suggest though in addition to applauding that activity is to also suggest that you broaden your reach and include Department of Energy, Department of Defense because they are going to be investing a lot of money-producing technologies that you all can capitalize on and utilize in your particular jurisdiction.

So I would hope you would broaden your reach because there is a lot of money going to be spent. There is a lot of environmental restoration we must do. There are a lot of processes, procedures, and technologies that we are going to develop through these other budgets, and I would hope that you would capitalize on them and utilize them in your important areas of restoration in your jurisdictions.

Secretary BABBITT. Thank you.

Mr. HOCHBRUECKNER. Thank you, Mr. Chairman.

The CHAIRMAN. The longsuffering gentleman from Virginia.

Mr. BATEMAN. Thank you, Mr. Chairman. I would like first to apologize for the fact that other committees kept me from being here at the outset and to certainly thank you, Secretary Babbitt and Administrator Browner, for coming and sharing your views with us. I am going to avoid the compulsion to make any speeches this morning in deference to the hour and to your schedules and to the others.

I do want to suggest that as much as I look with favor upon the beneficial things you may do for the Great Lakes and the Gulf of Mexico and Galveston Bay and other areas, please don't abandon our efforts to improve and enhance the quality of the magnificent Chesapeake Bay. There are a number of facilities, Secretary Babbitt, that we enjoy in the part of Virginia that I represent; one in particular, the Assateague Wildlife Refuge.

I am also mindful that another activity of your agency or your department, the Park Service, has under an operating agreement a portion of that that is used as a public beach. It is the only public beach available for a very, very considerable stretch of that portion of the Atlantic Coast. I think that has been a very workable and very beneficial arrangement, and I hope that that kind of arrangement on proper terms, proper constraints will continue.

Secretary BABBITT. Mr. Chairman, I must tell you my teenaged sons have delivered me the same warning.

Mr. BATEMAN. With that, Mr. Chairman, I will suspend again with my thanks for the Secretary and the Administrator being with us. I look forward to working with them. I am encouraged by much of the views that I have heard them express today, mindful of the fact that we are dealing on a macrolevel today, and as someone has reminded us, the Devil seems to be in the detail, but I will be delighted to work with you on that.

The CHAIRMAN. I thank the gentleman. I want to thank our two very distinguished witnesses. It has been a long day, and in your case, Carol, you have had to survive what is euphemistically termed the other body as well. We respect and admire you for doing that. Mr. Secretary, I have to observe that your panda, which

I assume will accompany you back to your fireplace, has had a growingly wide smile throughout the course of the morning. I can't see your leopard, but I am sure the same is true for that.

Ms. BROWNER. I hope.

The CHAIRMAN. We really thank you. We have a lot of work to do together. We are looking forward to that. We wish you Godspeed on your mission tomorrow in the Northwest. I think on the success of that mission lies the key to our ability to do much of what we have been talking about throughout the morning. We thank you, and we look forward to working with you.

Secretary BABBITT. Thank you.

Ms. BROWNER. Thank you.

The CHAIRMAN. And thanks for sticking it out. Now, let me observe that while the next panel arranges itself, it is our intention to find a way to proceed even without interruption in the case of a vote. We will spell each other voting so there won't have to be an interruption in the proceedings here. So we'll get going as quickly as possible, if the next panel can rearrange itself.

Mr. LAUGHLIN. Mr. Chairman?

The CHAIRMAN. Yes, sir.

Mr. LAUGHLIN. Could we start a new list on sequence of asking questions?

The CHAIRMAN. The Chair will attempt to do something fair, if not intelligible, here. Just a moment. Let us try and accomplish this as quickly as we can. I know it is complex.

[Recess.]

The CHAIRMAN. We now go to our second panel. I trust it has been plain to you the brutality and barbarity of our system of lights. You had a chance to see them operate here. Unlike the members of the Cabinet, we are going to apply that light system to the witnesses, as well as to the members, in this round. We will proceed, unless you wish otherwise, in the sequence in which your names appear on the witness list, and I know each of you has been asked to do the very difficult thing of summarizing your written testimony and confining your oral testimony to no more than five minutes. We apologize for the necessity of that, but as you can see, we are already going to miss lunch, and it would be a shame if we also missed dinner.

In case you haven't been able to see those lights, the yellow light indicates that you have one minute left, and the red light indicates that you have concluded your testimony. We apologize for that, but as you can see, there is no other way physically to accommodate everyone that needs to be heard. We will begin with Mr. Michael Mantell, the Undersecretary of the California Resources Agency. Mr. Mantell, welcome.

STATEMENT OF MICHAEL MANTELL, UNDERSECRETARY, CALIFORNIA RESOURCES AGENCY

Mr. MANTELL. Thank you, Mr. Chairman, and members of the subcommittee. I appreciate the opportunity to be here. I will summarize my testimony, but if I may digress just for one moment, I was the former general counsel of the World Wildlife Fund who licensed those products that you have given out, and I am very appreciative of the fact that they are now distinguishing these quite important halls as well as those of shopping malls around America. Let me start——

The CHAIRMAN. The record will reflect that.

Mr. MANTELL. Let me just briefly summarize my testimony in giving you the context of these issues in California and how we are attempting to address them. Each of California's 58 counties has a species that is listed as threatened or endangered under either the Federal or state Endangered Species Act. There are more than 125 federally listed species in the State of California, and more than one-third of the total candidate species identified by the U.S. Fish and Wildlife Service reside in California.

In the recent settlement late last year by the Department of the Interior of a lawsuit that committed them to listing some 400 species over the next four years, 162 of these reside in California. Every conceivable area in California is affected by a listing, and, in fact, this morning, Governor Pete Wilson of California, had a press conference talking about the problems in the delta area of California, the hub of the state's water delivery system, where there is currently uncoordinated and unmanaged Federal and state activities going on in regards to endangered species affected California's precious water resources. Similarly, California is affected by massive population growth which now is about 31 million people and all projections show to be 41 million people in the year 2010. It is growing at the rate of some 600,000 people per year.

And, finally, the state, as many other states and areas are facing, has enormous fiscal crises. State budget deficits have been records the last two years. We are facing another one this year which means that, especially at state and local government level, we simply have to find new ways of solving problems and reconciling legitimate needs if we are to serve the public effectively and to solve these problems.

Taking these factors into account, we have formulated three principles to guide our activities in the areas of biological diversity and endangered species. They are very similar to the ones that both Secretaries and Administrator Browner talked about today. The first is, and has to be, prevention. Anticipatory approaches need to be at the heart of future efforts in reconciling the needs of biological diversity with that of economic development. We cannot wait until we are at the crisis stage on these issues, until species are taking their dying breaths, and our only options are those akin to artificial resuscitation.

Second, we must take a broader ecosystem focus. The species-by-species, project-by-project, site-by-site focus embodied in the Endangered Species Act simply does not take into account scientific or jurisdictional realities. And it only serves in many cases to heighten the polarization that clearly characterizes these issues.

And third and finally, locally based processes provide the most promising opportunities for resolving these issues. As Secretary Babbitt has stated, it is at the local level where decisions are made day in and day out about how land is used through a myriad of zoning and land permitting decisions. We simply have to better incorporate decisionmaking about wildlife needs and environmental needs into local processes if we are ultimately going to be successful in reconciling legitimate economic and environmental objectives before they become crises.

In terms of this context and these principles, what have we been doing in California? Largely, two things. One is, and both occurred actually in the fall of 1991 and are proceeding at different paces—the first is we signed a memorandum of understanding on the conservation of biological diversity with all the leading land managing entities in the State of California at the Federal level, at the state level, and at the local level. The memorandum of understanding of biological diversity does not displace any statutory requirements that already exist for those land managing entities, but it recognizes the inherent limitations of the traditional approaches that we have been working on to maintaining biological diversity and accommodating necessary economic development.

It looks at the state in terms of 10 distinct bioregions. The Secretary of Resources, Doug Wheeler, Chairs this council. It meets quarterly and is focused in two specific areas. One is on providing better statewide coordination, to have the state and Federal agencies and local governments act as a clearinghouse for local efforts and embark upon a resources inventory. And, two, is to foster regional and local action tailored to the needs of particular areas. We are undertaking different tasks in different areas conforming to the different needs there, particularly in the Sierra Nevada region and the Klamath Province on the north coast.

The second major action we have taken is called Natural Communities Conservation Planning, enacted by the legislature and initiated by Governor Wilson, to allow us to get ahead of the curve, to work collaboratively with landowners, local governments, and conservationists in designing ecosystem-based plans in anticipation or in conjunction with endangered species listings. We have applied it in its initial pilot stage in the coastal sage scrub area of southern California, and we have, as part of that, entered into a memorandum of understanding with the U.S. Fish and Wildlife Service which has been referenced in the special rule regarding the recent listing of the gnatcatcher as threatened.

We have entered into a series of enrollments, voluntary participation by landowners and local governments, and we have formed an advisory committee facilitated by the California Environmental Trust to bring all interested parties together and work on a plan. Most notably, we have a scientific review panel that is ensuring that this is scientifically driven.

The CHAIRMAN. Please take one more minute. It is a very large state.

Mr. MANTELL. Thank you. I appreciate your recognition of that. Let me just conclude, and I will leave it open for questions, that we will need substantial technical and financial assistance from our Federal partners if these anticipatory ecosystem endeavors that foster compatible economic development are to be successful. We are trying to chart new scientific and policy frontiers that I think in the long-term will save costs but in the short-term require new skills, new working relationships and technology if they are going to be successful.

These are very much experiments. There may not be a panacea, but we think that, especially the NCCP effort in southern California, hold great promise in terms of locally based collaborative planning, long-term habitat conservation, and integrating necessary development. We appreciate this committee's interest in what we are doing and look forward to working with you in trying to foster more creative, innovative approach to these issues at state and local levels, where if we are going to be successful, that is where the initiative has to come. Thank you very much.

[The prepared statement of Mr. Mantell may be found at the end of the hearing.]

The CHAIRMAN. Thank you very much, sir. Next, Mr. John Sawhill, President of The Nature Conservancy, who I assume is recovering from the praise given him by the Secretary of the Interior a moment ago. Welcome.

Mr. SAWHILL. Yes. I have fully recovered, Mr. Chairman.

STATEMENT OF JOHN SAWHILL, CEO/PRESIDENT, THE NATURE CONSERVANCY

Mr. SAWHILL. Thank you very much for this opportunity to appear before the committee, and let me just say at the outset how much I appreciate your opening statement because I think it is a very eloquent statement in support of biodiversity, and we appreciate that at The Nature Conservancy very much.

I have been asked to comment on two issues: one, the status of endangered species on Federal lands and, second, how the government can better protect these species. We have heard an awful of comment from the three members of the Administration and from Undersecretary Mantell about the latter issue and about the need for a coordinated Federal/state response, so I think I will devote most of my remarks to the status of endangered species on Federal lands.

To address this issue, I am submitting a report called "Perspectives on Species Imperilment" to the committee. This was generated by the 50 state Heritage Data Centers and the Heritage Data Center on the Navajo nation, and it describes the distribution of listed species. And I would just like to give you a few examples from this report because, as Secretary Babbitt said, I think one of the keys to dealing with this whole question of endangered species is getting high-quality information.

As you know, Secretary Babbitt has made a proposal to generate a national biological survey, and I know he has discussed this with the members of this committee. One of the points that he has made is that this survey should use as one of its basic building blocks the state Heritage programs. And, of course, we fully endorse that concept.

Our experience with biological information is really that there are three lessons that we should learn. One is that information should help guide short-term decisionmaking. Second, that it should be available to a wide variety of users in a form that they can—use to the scientific community, to state governments, to Federal agencies, and the conservation organizations, as well as to corporations and members of the real estate development community. And, finally, that this information should be based on proven systems. There is no need to reinvent the wheel. We should take existing systems and programs like the state Heritage programs and build on those.

I think I would like to illustrate the value of good information by just giving you a couple of examples from this report that we are submitting for the record. On the top, we have shown, I think, a very interesting example of how important it is to get out ahead of the problem, something that all of our witnesses have discussed this morning. This chart shows three classifications of species: Those that are critically imperiled, those that are imperiled, and those that are vulnerable—how the U.S. Forest Service, as Secretary Espy pointed out in his testimony, is really attempting to get out ahead of the problem.

The service has classified a number of species as sensitive. They are not yet endangered, and they are not yet legally listed with all the regulatory problems and issues that that involves, but they are classified as sensitive by the Forest Service. As you can see on this chart, the Forest Service is making an attempt to deal with them now, before they become endangered. And I think we ought to commend the Forest Service for that, and also I think it does illustrate that the information that we have available can help the committee in thinking about these issues.

The second graph is also quite interesting because what it really shows— again, using this Heritage data—is how important it is to look at different classifications of species and the relationship between the condition of the species and whether or not they have been listed. What we see from this chart is that for mammals and birds and reptiles we are not in too bad shape. We have protected species. The percentage of species protected and the percent that are critically imperiled is in reasonably good balance. But for aquatic species, the situation is not very good. And I think what this chart on the bottom really shows is that we need to do a lot more to protect watersheds.

So the point of my testimony is to show the value of this information, to applaud Secretary Babbitt's efforts to create a national biological survey, and to try to stress that this survey should use as one of its basic building blocks the state Heritage programs that we have been working on for a 20-year period and which, I think, can provide us with something that can enable us to go forward quickly, to use this information wisely, and to incorporate it into a larger survey. So thank you very much, Mr. Chairman.

[The prepared statement of Mr. Sawhill may be found at the end of the hearing.]

The CHAIRMAN. Thank you, sir. It would appear that for the moment you are the closest thing we have to a national biological survey.

Mr. SAWHILL. Yes. I think that is correct.

The CHAIRMAN. I appreciate that. Next, Mayor Nelson Wolff of San Antonio. Forgive me. I, obviously, forgot myself in referring to California as a large state. Mayor Wolff.

STATEMENT OF MAYOR NELSON WOLFF, SAN ANTONIO, TEXAS

Mr. WOLFF. Thank you, Mr. Chairman. I want to thank Congressman Fields for arranging for me to testify today and to Senator

Kruger and to Secretary Babbitt for visiting with us in San Antonio in an effort to resolve the dilemma that we find ourselves in.

The endangered species case, which is before us in the Edwards Aquifer lawsuit, is being used to harm the environment. It is being used to create enormous and unnecessary economic and human costs, and as Secretary Babbitt said, in effect, it is being used as a pawn in a really Texas water fight.

San Antonio sits in the middle of this 175-mile-long aquifer. The water flows in from the west, goes underneath us, and comes out in two springs in San Marcos and Comal, and it is our sole source of water. Judge Bunton just recently ruled that to protect the fountain darter, an endangered species, that we must guarantee spring flow at Comal Springs even during a drought of record. The effect of that ruling is a 60 percent reduction on our current pumpage out of the aquifer. That drought of record occurred in the 1950's. The Texas Water Commission says this drought will occur in about a 200 to 300 year timeframe—once in a 200 to 300 year timeframe.

While the Comal Springs has the fountain darters, the San Marcos Springs has them also. There are hundreds of thousands of the fountain darters in San Marcos Springs just a few miles from us, and it has never gone dry in recorded history. The Texas Water Commission calls a 60 percent reduction drastic, that it creates an unacceptable risk to public health and safety and could devastate the region's economy. They went on to say that the requirement would be a massive undertaking for additional water resources unparalleled in the region's history and perhaps in the history of the State of Texas. You have heard the effect on jobs and the economic costs by Congressman Fields, but there is an environmental cost, and that is what happens when you look at one thing and don't measure what happens to the rest of the environment.

To create 270,000 surface acres of water would be a detriment to the environment causing humans to move as well as perhaps many other endangered species. It is, in effect, a water fight in San Antonio. But the Judge said that he could not take into consideration economic, human, or environmental costs under the Act. It is unprecedented use of this Act against an historic use of water that dates back to the finding of the Alamo. It affects the health and safety of all of us. If it can be used against our city, it can be used against any city in the United States. The spotted owl problem is one of a great controversy. If this spreads across the nation, the spotted owl will be a minuscule problem to deal with.

The Court Order really, in effect, gives me a couple of choices if they seek to enforce it. I can help shut down the water for the city of San Antonio, or if I am not in compliance with this Order, I guess he could send me to jail. The cutback on water like he is asking us to cut back is like asking us to cut back on the very air that we breathe.

San Antonio has been good stewards of the aquifer. We have a strong conservation plan, a drought management plan, a reuse plan, a leak detection plan. We fund 90 percent of the Edwards district, which provides for recharge and protection of the Edwards. We have set aside land. We have one of the lowest per capita use of water, about 160 gallons per capita. We have not increased our use of water out of the aquifer in the last 10 years, and we do support a management plan that would limit us to our historic use and put caps on future use. We have hired just about every lobbyist in the State of Texas to do this and pass it this season, and we will, and thank goodness we didn't have to hire them here. We would never have been able to afford it.

But it is not a problem just with the Judge. It is a problem with the Act. We think that economic and human considerations ought to be taken in consideration, that, indeed, you need to be compensated when your historic use is taken away from you, and we do believe that as Congressman Studds said earlier, what can you do to head these things off? We think if you use a carrot and not a stick, that if you work with us as partners and not as adversaries, provide financial incentives and expertise for us to do things such as we are doing with the Nature Conservancy when we bought 4,800 acres of land that we are participating in when we developed 800 acres of land as a wetlands and one of the best bird sanctuaries of anywhere in the nation.

If we will do those things and work together, we can solve and head off the things that you would like to do, Mr. Chairman, but we need to be partners in that effort, not be threatened by a Federal Judge or Federal agency or by the Congress itself. We do support House Resolution 888 and 1490 to seek some sort of balance within the Act. Thank you very much for allowing me to appear today.

[The prepared statement of Mr. Wolff may be found at the end of the hearing.]

The CHAIRMAN. Thank you very much, sir. And, finally, Mr. John Specht, Director General of the Guadalupe-Blanco River Authority. Mr. Specht.

STATEMENT OF JOHN SPECHT, GENERAL DIRECTOR, GUADALUPE-BLANCO RIVER AUTHORITY

Mr. SPECHT. Thank you very much, Mr. Chairman, and members of the committee. My name is John Specht. I am General Manager of the Guadalupe-Blanco River Authority. The Authority is a large, 10-county governmental entity created by special statute of the Texas legislature. The primary purpose is to protect the environmental and economic health of the Guadalupe River Basin.

I really appreciate this opportunity to testify before this committee on the question of how to improve the conservation of our biological resources, important habitats and ecosystems especially as that question is affected by the Endangered Species Act. Relevant to this hearing are the circumstances surrounding a major controversy involving the southern Edwards Aquifer and the three river basins that cross the aquifer and are hydrologically interrelated. The aquifer and its two primary spring outlets are part of a unique ecosystem which contains a number of threatened and endangered species.

Increasing heavy pumpage from the aquifer by municipal, industrial, and agricultural users threatens the spring flow to the Guadalupe River especially during periods of drought. This pumpage also threatens to contaminate the aquifer as a water quality supply by causing intrusion of bad quality water containing high concentrations of minerals and hydrogen sulfide, which, of course, is classified as a hazardous substance. The listed threatened and endangered species serve as the proverbial "canary in the coal mine" for the Edwards Aquifer and the three river basins affected by the aquifer.

The problems associated with overpumpage of the aquifer first became apparent in 1956 at the peak of a drought of record when the aquifer dropped to a historic low level. The Comal Springs dried up for a period of five months. The San Marcos Springs dropped to a historic low level of 46 cubic feet per second. The movement of poor quality water into the freshwater zone of the aquifer forced the closure of many municipal wells along the southern boundary of the aquifer.

In the decade of the 1980's, the region experienced three mild droughts, in 1984 and again in 1989–1990. The heavy pumpage from the aquifer coupled with reduced recharge quickly dropped spring flow to critical levels. These events and projections of continued growth of the metropolitan area led the GBRA Board of Directors to the decision to press for regulation of the aquifer by the state and the immediate development of alternative resources to supplement aquifer users. Regional leaders through numerous public meetings and study reports were advised of the problems and warned of the risk of water shortages to the region and to the environment.

The essence of the problem is that this entire region of Texas is not prepared for major droughts. The region includes San Antonio, the ninth largest city in the United States. This region is not prepared for major droughts because its water supply is simply inadequate.

With all efforts producing no tangible results, the Lone Star Chapter of the Sierra Club filed suit in Federal Court seeking protection for listed threatened and endangered species, critical habitat of the San Marcos Springs, and enforcement of the U.S. Fish and Wildlife recovery plan for the San Marcos Springs. GBRA and others immediately joined the Sierra Club as Plaintiff interveners. The lawsuit was heard by Judge Lucius Bunton in Midland, Texas, in November of this past year.

The Court's ruling, which has been submitted to the committee with our written submissions, recognizes the requirements under the Endangered Species Act to protect the aquifer from overpumpage and maintain spring flow to avoid jeopardy to endangered species. The Court ordered specific determinations of spring flow by the U.S. Fish and Wildlife Service and provided a timeframe for legislative action at the state level to establish a system of regulation of the aquifer by the state to avoid Federal intervention. The Court confirmed what was common knowledge, that the yield of the aquifer is approximately 200,000 acre-feet per year. The Court also confirmed that because of the risk of severe water quality harm, the firm yield of the aquifer should be the same amount even if the needs of endangered species were disregarded entirely.

There is no shortage of alternative resources in the region associated with the Edwards Aquifer. Rather, the required supplemental water resources need to be systematically evaluated, then developed on a timely basis. The additional water supply should include in order of priority conservation, reuse of wastewater, recharge enhancement, interbasin transfer of water from the Guadalupe and Colorado Rivers, and possible future development of surface water reservoirs.

The Endangered Species Act is a strict Federal law that has served to prevent the extinction of certain species and prevent the loss of selected habitat critical to this nation's environmental health and quality of life. There is no doubt that application of the Act has served to increase the cost of many public works and private developments, and in a few instances has precluded projects and developments. Some changes to the Act may be appropriate. In the main, however, the Act and the congressional intent that underlies the Act have served the Nation well.

A consideration to improve the application of the Endangered Species Act to conserve this nation's biological diversity should be the early and proper identification of ecosystems that need to be protected. Such a process, if actively applied, would serve to limit or modify biologically harmful activities prior to the need to list and protect specifically endangered species. Such an approach might have served to avert the crisis we now face with the Edwards Aquifer.

Use of water from this entire system should have been regulated long ago so as to protect the entire system all the way to the Gulf of Mexico. The unique ecosystem as evidenced by the biological diversity of the Edwards Aquifer and in the associated spring flows at Comal and San Marcos Springs had been identified 20 to 25 years ago. The risk of overpumpage became obvious immediately following the drought of the '50's. Yet nothing was done to limit pumpage and sustain the ecosystem that was innate to it.

The CHAIRMAN. I hate to tell you, but your red light is on, sir.

Mr. SPECHT. Thank you, Mr. Chairman, and I will wrap it up very quickly. Mr. Chairman, members of the committee, this train wreck needs to be cleaned up and cleaned up quickly and properly. We sincerely hope that the issue does not become a political football to be misused for purposes wholly unrelated to the merits of this issue. That kind of posturing can only delay the real solution and make it even more painful than it is now. I would be happy to respond to any questions that the committee may have, Mr. Chairman. Thank you very much.

[The prepared statement of Mr. Specht may be found at the end of the hearing.]

The CHAIRMAN. Let me just observe that this committee is against train wrecks. They are in another committee's jurisdiction. We can't have that. Those are the bells which announce the almost conclusion of this hearing. The Chairman is going to gracefully yield to the fact that he is surrounded by Texans, and not only that, by warring Texans. I have Texans before, Texans on the right, Texans on the left. For all I know, one of these angels above me is a Texan. It is a very uncomfortable situation to be in.

Let me just quickly observe before I yield to the Texans for the remaining time; Mr. Mantell, where you and your State are is clearly where, to a large degree, the Federal Government hopes to get. We are going to need to draw on your experience and your wisdom in that process, and we hope you will be available to work with the committee as we proceed.

Mr. MANTELL. We very much will, and I encourage you to accept Congressman Fazio's recent invitation to perhaps hold a field hearing or two out in California.

The CHAIRMAN. That is very tempting. Now that we have our budget, we may be able to do that. I appreciate that.

Mr. MANTELL. We would look forward to assisting your efforts in any way we can.

The CHAIRMAN. Thank you. Mr. Sawhill, as I said, you have blazed the way, that we hope to be able to learn a great deal from your experience. If I had time, I would—well, probably the Texans will ask you this anyway—I would ask you to expound on your last great places, most particularly with respect to Nantucket, Martha's Vineyard, and Cape Cod. I am sure that is what the Texans are going to ask you anyway.

Mr. LAUGHLIN. That is right in the middle of my district.

The CHAIRMAN. We had a traumatic redistricting, but it wasn't that bad.

Mr. SAWHILL. Thank you, Mr. Chairman. We would look certainly forward to working with this committee on the development of the National Biological Survey because as you correctly point out, the National Biological Survey today is the state Heritage programs and the network system maintained by The Nature Conservancy.

The CHAIRMAN. I appreciate that.

Mr. SAWHILL. And I would say that the coastal grasslands of Nantucket and Martha's Vineyard are a very important ecosystem that we are working on and working with your constituents on, and I think we have a real opportunity——

The CHAIRMAN. I will be on both islands this weekend, and I look forward to learning a lot between now and then. I appreciate and respect what you are doing. Unfortunately, I will be dressed this way. I won't be there for rational purposes. The remaining time I am going to invite the two Texans to divide amongst themselves, and if you go overtime, you can Chair the remainder of the hearing, because there is a vote on the floor. I will go first to the gentleman from Texas, the ranking member, Mr. Fields.

Mr. FIELDS. Thank you, Mr. Chairman. Let me just say at the outset how much I appreciate you having this hearing today, and, yes, looking up, I think those angels are Texans and appreciate you making that observation.

Mayor Wolff, Secretary Babbitt said earlier today that the best thing that has happened to San Antonio is the Endangered Species Act and a listing of the fountain darter. Do you agree?

Mr. WOLFF. No, I don't. Let me tell you what has happened since that. The farmers have become more adamant, and not only mad at the city of San Antonio because we are trying to compromise, now they are mad at the Federal Government and everybody they can see they are mad at. The people to the east of us want to grab as much water as they possibly can for no cost. He has told you he wants to aquifer to go down to 200,000 acre-feet when we have got 25 to 50 million acre-feet of water in the aquifer. We are willing to cap at historic use. We are in balance now, about 500,000 acre-feet of pumpage, 650 acre-feet of average recharge, leaves 150 overall for the springs.

We cannot control droughts, and I don't think the Secretary was correct in his analysis. You need to go back and talk to this guy over here and talk to the farmers and see if it can be changed, but it didn't change now. The attitudes are just as hard as they were before, if not harder.

Mr. FIELDS. So what you are testifying to is that this has actually been very divisive and has actually exacerbated an already difficult situation?

Mr. WOLFF. It is a total misapplication of this Act. The Secretary, in effect, said that earlier, and if a Federal Judge has that much power in Midland, Texas, to control what we are doing in San Antonio and the Edwards, any Judge can do that anywhere. So it is just—it is not a proper use of this Act and in this case going to harm the environment. Can you imagine what it would be like to try to go out and build 270,000 acre-feet of reservoirs under the existing environmental laws today? The partner to the suit, the Sierra Club—and the one small one we tried to build, they fought that and helped defeat that. So, you know, you are caught either way.

Mr. FIELDS. Mayor, you talked about some of the things that the city has done. What you didn't mention, as I understand, there has also been some options brought forward on augmentation of the springs. You know, the people are looking for alternatives, and I tried to press this with the Secretary earlier, because it seems to me that if you have as your goal the preservation of a species, you know, we can all work toward that goal. That goal is not to be compromised, but that we can look for alternatives. And if you could expound on that——

Mr. WOLFF. There are alternatives. In fact, I don't know the big mystery or why people get so upset about augmentation. We augment the San Antonio River. The springs in the rivers can be augmented. We are doing a study on that right now. It will take us a while to complete it, but that is an option. Another option is additional recharge. As I mentioned, we were partners with the Nature Conservancy in buying 4,800 acres of land over the recharge zone where we can perhaps use that to enhance recharge as well as a habitat. Secretary Babbitt spoke about that. We can be partners in a lot of those things. In this particular case, we are doing it all with local funds, and basically every bit of the money is coming from our city.

Mr. FIELDS. Mr. Specht, you know, we are, you know, talking among Texans, and we have got perhaps competing views. I was concerned about one sentence in your statement where you said with all efforts producing no tangible results, your Authority looked to the Endangered Species Act to bring the critical risk to the region to the attention of state and local leadership.

And you probably heard me say earlier in the hearing I am very concerned about the basic rule of capture, you know, something that affects all of us as property owner. I am a property owner, and I mentioned earlier about my water well. And certainly the farmers and ranchers of the state are very concerned, not just in the Edwards aquifer but people up in the Ogalalla—you know, people like myself that draw from the groundwater in the Gulf Coast region. Surely, it wasn't your intent to abrogate that rule of capture?

Mr. SPECHT. Mr. Fields, I also am a landowner, and I also have a number of wells that I draw on for livestock use. And, indeed, I am not anxious to see the loss of the right to use some of that water. The problem with the Edwards Aquifer, however, is quite unique in that here we have a resource, a very unique and a very large resource, but it is now being stressed to the point that it cannot produce what everybody needs all of the time especially during periods of drought.

So under those circumstances, we need some form of regulation in order to share that resource among these various users that are dependent upon it. That is the key here—in effect, a sharing, and in the final analysis, I believe that because of the unique nature of this aquifer that regulation is going to be a form of protection for those landowners while it will define to some extent the amount of use that they will be able to continue from the aquifer.

That is a form of protection that is very critical to them because this aquifer, by its nature, can be drawn down by one or a few very large wells such as a large catfish farm that began pumping a huge well some 30 inches in diameter under artisan pressure that threw the water up into the air some 15 feet.

Mr. FIELDS. My time is about to expire. Let me just ask because I feel like part of your testimony—you do not want the Federal Government to regulate in instances like this, do you? To get involved with the water rights in Texas?

Mr. SPECHT. No. We made it very clear, I think, at the outset that we are interested in seeing this regulated on a state/local basis. The problem was we needed some means of causing that to happen. There simply had been no action to move toward regulation or the development of alternative resources particularly by the major user, and that is the city of San Antonio and its environs. And here we are since 1956 having made no progress, and it is critical to the region. The risk is too great to allow that condition to continue. We have to find a way to move this issue forward and resolve it hopefully with state/local regulation.

The CHAIRMAN. I think we are all about to expire. Does the other gentleman from Texas wish to——

Mr. LAUGHLIN. Thank you, Mr. Chairman. Since time is short, I will dispense with the pleasantries, Mr. Mayor, because everybody loves your city that I have ever talked to, but it is true that the Edwards Aquifer is the sole source of water for the city of San Antonio, but it is also true that your city has not developed any alternative sources of water. Isn't that correct?

Mr. WOLFF. Well, partly correct. We approved the building of a reservoir which the Sierra Club led an effort to defeat by the public even after that vote—after great public outcry. We have kept that permit alive. We are continuing to condemn the land today. We are moving in the legal aspects. Once we find out where we are on this, we will go back to the people of San Antonio and try to great them to approve this. It is not right to say that nothing has been done. When you don't increase your water in 10 years and you have had a population increase, you have done a lot through a lot of other things.

Mr. LAUGHLIN. Well, it is true you are the only major city in Texas without an alternative source of water. Is that correct?

Mr. WOLFF. That is correct. I think that is correct.

Mr. LAUGHLIN. And it is also true that for all the cities or municipalities in your region, you by some measurement have the lowest water prices?

Mr. WOLFF. We do have relatively low prices but the same as Dallas. Dallas water prices are basically no different than the prices of water in San Antonio. But you must remember, we are a relatively poor city whose majority is minority. We do not have an industrial base so our per capita use is very, very low.

Mr. LAUGHLIN. Well, I would argue with you that the industrial base——

The CHAIRMAN. That was the five-minute bell.

Mr. WOLFF. Sir?

The CHAIRMAN. That was the five-minute bell.

Mr. LAUGHLIN. That the municipalities I represent have very much the same socioeconomic background that you have. I represent Gonzales and Hays Counties and then onto the coast, and all those small towns have much higher water rates than San Antonio. Isn't that true?

Mr. WOLFF. I don't know what theirs are. I know what ours is compared to a major metropolitan area, and they are about the same with Dallas.

Mr. LAUGHLIN. In this water fight, you have not heard anyone say that San Antonio had higher water rates than any of these small municipalities in the San Antonio region, have you?

Mr. WOLFF. I would imagine their cost of developing water is much, much more expensive. They don't have the number of users that we use, but comparing us to a major metropolitan area, we are right in line with Dallas.

The CHAIRMAN. The Chair apologizes. Does the gentleman have a 10-second peroration?

Mr. LAUGHLIN. No. I really have more.

The CHAIRMAN. But you can't because we have got to vote.

Mr. LAUGHLIN. It is true——

The CHAIRMAN. You have four minutes.

Mr. LAUGHLIN [continuing]. that this is trying to be resolved in the Texas legislature?

Mr. WOLFF. And we are very supportive of that.

Mr. LAUGHLIN. And isn't it better to resolve this dispute in the Texas legislature than here in Congress?

The CHAIRMAN. Without objection.

Mr. WOLFF. You are absolutely right.

Mr. LAUGHLIN. And the last thing I would ask you to agree to, and then I will get up and walk out, there are farmers and ranchers on both sides of the aquifer. Isn't that correct?

Mr. WOLFF. Correct.

Mr. LAUGHLIN. And there are farmers and ranchers on the Gulf of Mexico side that are concerned that the city of San Antonio or any other city could drain the Edwards Aquifer dry, and then they would be without a water supply on the Gulf side. Is that correct?

Mr. WOLFF. Correct, but let me remind you one more time that in 10 years with a population growth, we are not using any more water.

The CHAIRMAN. I am sorry. The Texans can reconvene in the hall. Let me just thank everyone. Forgive us for the rapidity of our departure. Do not try to ask us any questions or stand between us and the door. This has been an enormously important and very interesting hearing. We appreciate your patience.

[Whereupon, at 1:25 p.m., the committee was adjourned, and the following was submitted for the record:]

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March 26, 1993

BACKGROUND MEMORANDUM

TO: Members, Committee on Merchant Marine and Fisheries

FROM: Committee Staff

SUBJECT: Hearing on the Conservation of the Nation's Biological Resources

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On Thursday, April 1, 1993, at 10:00 a.m., in room 1334 of the Longworth House Office Building, the Committee on Merchant Marine and Fisheries will conduct a hearing on the conservation of the nation's biological resources. Witnesses will include the Secretary of the Interior, the Administrator of the Environmental Protection Agency, a representative of the Department of Agriculture, the Under Secretary of the California Resources Agency, the President of the Nature Conservancy, the Mayor of San Antonio, and other public witnesses.

BACKGROUND

The Endangered Species Act (ESA) is the principal Federal statute focused on the conservation of our biological resources. It is designed to provide a lifeline for species that have dwindled to the point at which they are threatened with extinction. Species are being proposed for listing under that Act at a rate of 100 per year -- clearly indicating that more needs to be done to conserve our natural resources. Strategies to conserve species and their habitats before they decline to the point at which they need protection under the ESA usually provide many more conservation options than are available once species become imperiled enough to warrant protection under the ESA. Those options translate, in many cases, into less severe social and economic impacts than those that result from measures necessary to protect endangered species.

For example, if a strategy had been designed and implemented several years ago to conserve the northern spotted owl and the old-growth habitat on which it depends, reductions in timber harvest could have been made gradually over a period of many years. Instead, court decisions have required drastic reductions in timber harvest over a relatively short time to protect the owl which is now listed under the ESA. Had actions been taken sooner to preserve adequate owl habitat, those dependent on the timber industry would have had additional time to adjust to the reductions in harvest levels, and the disruptions to local economies would not have been as severe. In addition, the

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long-term conservation of other species of concern which are dependent on habitat in the owl's range, such as the endangered salmon runs in the Pacific Northwest, could also have been addressed, avoiding individual species-specific controversies.

As described later in this memorandum, existing federal law (the National Forest Management Act) requires the Forest Service to provide for the long-term conservation of species such as the spotted owl. It was the failure of the Forest Service and the Bureau of Land Management to comply with that law and the National Environmental Policy Act (NEPA), that has been the basis of most of the litigation in the Pacific northwest.

THREATS TO SPECIES

The Environmental Defense Fund and the Wilderness Society have gathered information from Federal Register notices on threats to threatened and endangered species and species proposed for listing and have generated the table below summarizing the major causes of endangerment of species. Note that because most species are threatened for multiple reasons, the totals exceed the number of listed species (645 listed species, 167 proposed species).

CAUSES OF ENDANGERMENT: PRELIMINARY ANALYSIS

	Number of Affected Species	
Cause	Listed	Proposed
Exotic species	241	74
Habitat conversion for commercial or residential use	226	55
Agriculture	188	44
Recreation (esp. ORVs, hiking)	184	42
Roads and infrastructure development	172	27
Over-collecting and over-harvesting	168	21
Grazing and range management	146	28
Mining, oil and gas development, geothermal development	122	19
Water pollution	121	28
Timber cutting and forest management	90	8
Water diversion	71	7
Channelization and dredging	66	18
Military activities	28	11
Wetland drainage	25	8

Source: Environmental Defense Fund and The Wilderness Society.

FEDERAL CONSERVATION OF BIOLOGICAL RESOURCES

The Federal Government can contribute to the conservation of biological resources -- or, conversely, to the degradation of those resources -- in three primary ways: first, through the stewardship of federal lands; second, through activities carried out by the federal agencies themselves; and third, through federal regulatory programs.

Public Lands

Approximately one-third of the land in the United States is owned by the Federal Government: in the western states, the percentage is much higher. The vast majority of it is under the jurisdiction of the Forest Service, the Bureau of Land Management, the National Park Service, the Fish and Wildlife Service and the Department of Defense. The National Forest Service is the only Federal agency with an expressed statutory directive to consider biological diversity in its land management decisions. The National Forest Management Act of 1976 specifically requires that the Forest Service develop land management plans that "provide for the diversity of plant and animal communities". Forest Service documents indicate that the agency implements this directive by recovering endangered and threatened species; protecting rare, unique and highly productive communities of plants and animals; and managing habitats to sustain commercial and recreational uses of the resources.

Approximately one-third of all listed species have some habitat on national forest lands, and for aquatic species that proportion is closer to one-half. According to the Forest Service, its lands provide our nation's greatest hope and opportunity for the long-term maintenance of a great many species and rare ecosystems.

While the other major federal land-owning agencies are not expressly directed by law to manage their lands to conserve biological diversity, programs within these agencies do address the conservation of biological resources to some extent.

The management of Fish and Wildlife Service lands -- national wildlife refuges -- is dictated in large part by the legislation, executive order, or administrative action that creates the refuge. The refuges' purposes reflected in enabling legislation or executive orders range from very narrow to very broad -- and by law are the guiding principles for the management of individual refuges. In many but not all cases, endangered species protection and biodiversity conservation are identified as purposes of the refuges.

The National Park Service is governed by the National Park System Organic Act and under this law is required to conserve wildlife in National Parks and to provide for the enjoyment of those resources in a manner that will leave them unimpaired for the enjoyment of future generations.

The Bureau of Land Management (BLM) is required by the Federal Land Policy and Management Act (FLPMA) to manage its lands to "protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource and archeological values." FLPMA directs BLM to manage these lands for multiple uses; specifically BLM must:

- preserve and protect certain public lands in their natural condition;
- provide food and habitat for fish and wildlife and domestic animals; and
- provide for outdoor recreation and human occupancy and use.

BLM is also mandated to give priority to designating and protecting "areas of critical environmental concern" in order to protect fish and wildlife resources.

Federal Activities

The Federal Government undertakes many activities, such as the construction of dams, bridges, canals, highways, and housing, most of which result in the alteration of habitat. As required by the ESA, agencies must consult with the U.S. Fish and Wildlife Service if those habitat alterations are likely to affect a listed species, and the agency must ensure that the project will not jeopardize the continued existence of the species. However, federal agencies are not required to review their activities to determine whether they are contributing to the decline of species that may soon become endangered.

Because of the lack of a mechanism for agencies to review their activities with a view to how they might affect biological resources, the Council on Environmental Quality (CEQ) published a report in January entitled "Incorporating Biodiversity Considerations into Environmental Impact Analysis under the National Environmental Policy Act." The report explains that it is intended to "provide background on the emerging, complex subject of biodiversity, outline some general concepts that underlie biological diversity analysis and management, describe how the issue is currently addressed in NEPA analyses, and provide options for agencies undertaking NEPA analyses that consider biodiversity." The report points out that it "does not establish new requirements for such analyses. It is not, and should not be viewed as, formal CEQ guidance on this matter, nor are the recommendations in the report intended to be legally binding."

Federal Regulatory Programs

The Federal Government administers many environmental laws and related regulatory programs that affect biological resources. Some are very obvious: the Environmental Protection Agency is responsible for administering laws on clean water, clean air, and wetland protection; the Fish and Wildlife Service has authority over imports of wildlife including introductions of exotic species; the Bureau of Reclamation regulates the diversion of water from rivers; the Federal Energy Regulatory Commission licenses dams; and, the Department of Agriculture administers farm programs designed to prevent soil erosion, wetland destruction and subsidy programs that potentially impact biological diversity.

As the list of threats to species noted earlier shows, many of the causes of endangerment of listed species could be preventable under these other environmental laws.

Federal Obligations under the Endangered Species Act

Section 5 of the ESA requires that the Secretaries of the Interior and Agriculture conserve fish, wildlife and plants (including listed species). That provision applies to land under the jurisdiction of the Forest Service, the National Park Service, the Fish and Wildlife Service, and BLM.

Section 7(a)(1) of the ESA requires federal agencies to utilize their authorities to carry out programs for the recovery of listed species.

Neither of these authorities have been used widely by federal agencies.

NON-FEDERAL CONSERVATION OF BIOLOGICAL DIVERSITY

Although the Federal Government can seek to avoid endangering species through its own activities and programs, the federal effort alone will not be enough for many species. The majority of lands in this country are in private ownership and any strategy to conserve biodiversity must find ways to encourage conservation actions by private landowners. State, local, and private interests have a significant role to play.

THE STATE OF CALIFORNIA

The State of California has initiated an innovative program to get ahead of the extinction curve -- called "Natural Community Conservation Planning" (NCCP) to anticipate and prevent controversies resulting from listing of species under federal or state endangered species laws. The goal is to protect entire ecosystems while allowing compatible economic development. The program works through voluntary, permanent, and enforceable conservation strategies that address specific habitats and species, setting out protected areas and areas appropriate for development.

A pilot program is underway to address coastal sage scrub, a habitat type supporting several potentially endangered or threatened species, including the California gnatcatcher, which was just listed as threatened this month. Private landowners have agreed to forestall development on 141,000 acres, some of which contains coastal sage scrub, for an 18-month period, while final conservation plans are developed. Development of the conservation plans involves landowners, local governments, and state and federal wildlife agencies.

SAN ANTONIO, TEXAS

An example of a conflict that can arise when conservation planning is not put into place is found in San Antonio, Texas. This conflict involves the use of water from the Edwards Aquifer, a natural underground water source used by 1.5 million people, and how those uses affect species listed under the Endangered Species Act. The parties involved include local agriculture interests, environmental groups, municipalities, water management commissions, state governments, and federal agencies. Several court decisions have been rendered mandating certain water flow rates and action plans. The Texas Water Commission has developed a water management plan for the Edwards Aquifer but lacks an explicit state legislative mandate to enforce its plan. Witnesses will address this issue at the hearing. (The Congressional Research Service has recently prepared a background report on the issue.)

THE NATURE CONSERVANCY/GAP ANALYSIS

The Nature Conservancy is a national, nonprofit, membership organization committed to preserving biological diversity by protecting natural lands and the life they harbor. It works with states through "natural heritage programs" to identify and acquire ecologically significant natural areas, and manages a system of over 1,600 nature sanctuaries nationwide. The conservancy has initiated a program called the "Last Great Places" in which areas of special ecological significance are targeted. The Conservancy seeks to acquire a core area, and works with surrounding landowners to provide for the sustainable economic use of the surrounding lands.

The network of heritage programs which were initiated by the Nature Conservancy (and subsequently adopted by the states) allow it to identify these ecologically sensitive areas. The heritage programs comprise a standardized nationwide inventory of rare and endangered plant and animal species, containing information -- on a state-by-state basis -- on the existence, population status and location of these species of special concern. This information has been adapted by the U.S. Fish and Wildlife Service in a system called "GAP analysis".

In GAP analysis, vegetative types and associated wildlife are identified and mapped. Those that are not represented within protected areas such as National Parks or Wildlife Refuges are then identified. The objective is to determine what types of natural communities are currently protected so that steps may be taken to provide for the long-term preservation of those natural communities that currently have little representation in protected areas. The theory is that if a sufficient amount of each type of natural community in the United States is protected, the species that depend on those communities -- which by definition will be all species in the U.S. -- will have sufficient habitat and won't decline to the point at which they need protection under the ESA.

The Secretary of the Interior has called for the establishment of a National Biological Survey to provide the information decision makers need to conserve habitat and prevent species endangerment, and has identified the GAP analysis as a key component.

ISSUES

1. FEDERAL LANDS. Many endangered and threatened species depend primarily on federal lands for their habitat. Members may wish to discuss the extent to which the Federal Government can minimize controversies over endangered species by conserving their habitats on lands under federal jurisdiction, and avoiding the need to list species that depend on those lands. Members may also wish to discuss the extent to which existing law authorizes or requires this kind of land management.

   In particular, the Forest Service was successful in heading off the listing of the California spotted owl by reducing timber harvests on National Forests in the Sierra Nevada. Members may wish to discuss why similar solutions were not found to avoid the need to list the Northern spotted owl in the Pacific Northwest or the Mexican spotted owl in the Southwest, both of which depend primarily on federal lands for their habitat.

2. FEDERAL ACTIVITIES. Members may wish to discuss the extent to which federal agencies have the authority (under the ESA or other federal law) to consider the impact of their activities on species that are not yet listed under the ESA. Members may also wish to discuss mechanisms federal agencies can use to make those considerations and modify their activities to reflect them.

3. FEDERAL REGULATORY PROGRAMS. Members may wish to discuss why the myriad existing federal environmental laws and regulations have proven insufficient to address the threats to endangered species (which are summarized in the table on page 2) and how they can better address these threats in the future. Wetland and water quality protection laws are but two examples:

   3a. WETLAND PROTECTION. Two hundred and fifty wetland-dependent species are listed under the ESA, and the populations of other wetland-dependent species, such as waterfowl, are far below long-term levels. Members may wish to discuss what this says about the adequacy and effectiveness of federal wetland protection programs -- both section 404 of the Clean Water Act and the 1990 Farm Bill -- which seek to minimize wetland destruction on agricultural lands.

   3b. WATER QUALITY. One-third of the native fresh-water fish in the United States are either endangered, threatened, or otherwise of special concern. Members may wish to discuss the extent to which water quality is a significant factor in those declines, and if so, how can our efforts to clean up our nation's rivers and streams be improved.

* MEMORANDUM *

TO: Congressman Alcee L. Hastings
FROM: David S. Harris
DATE: April 1, 1993
RE: Conservation Of The Nation's Biological Resources

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Opening Remarks:

THANK YOU MR. CHAIRMAN. IT GIVES ME GREAT PLEASURE TO BE HERE TODAY. I WOULD LIKE TO THANK OUR SELECTED WITNESSES FOR COMING HERE TO DISCUSS THE CONSERVATION OF OUR NATION'S BIOLOGICAL RESOURCES.

WITH THE DEPLETION OF MUCH OF THIS NATIONS' BIOLOGICAL RESOURCES, THE UNITED STATES MUST TAKE AN AFFIRMATIVE ROLE TO PRESERVE OUR ENVIRONMENT. THE STATE OF FLORIDA HAS TAKEN EXTRAORODINARY MEASURES IN CONSERVING ITS NATURAL RESOURCES. THIS DEDICATION IS A TOP PRIORITY IN OUR STATE, AND THIS COMMITTMENT SHOULD ALSO BE ON A NATIONAL LEVEL. THIS HEARING WILL HOPEFULLY FIND WAYS TO INSURE THAT THE UNITED STATES RECOGNIZES ITS DUTY IN PROTECTING THE ENVIRONMENT.
THANK YOU MR. CHAIRMAN.

STATEMENT OF SECRETARY BRUCE BABBITT, DEPARTMENT OF THE INTERIOR, BEFORE THE HOUSE COMMITTEE ON MERCHANT MARINE AND FISHERIES, CONCERNING MANAGEMENT OF THE NATION'S BIOLOGICAL RESOURCES

April 1, 1993

Thank you very much, Mr. Chairman, for the opportunity to address this important issue. Biodiversity has become an issue of concern for the world community over the last few years. Attention to the issue has been focused by the rapid destruction of moist tropical forests throughout the world -- forests that may collectively hold as much as half of the world's total number of plant, animal, and insect species.

We should not, however, allow our concern for the maintenance and protection of the world's biodiversity resources to be limited to tropical forests. It is an issue for us as well. The biodiversity of this Nation, comprising not only the wealth of our native plant and animal species, but also the multitude of ways in which they interact with one another, is one of our greatest blessings.

Habitat that ensures biodiversity is not only important in the 50 States, but also in the United States-related insular areas. These fragile island ecosystems face tremendous challenges. The rainforests in Samoa and Puerto Rico suffer from human encroachment. Numerous living reefs, critical for protecting the islands, are in decline. The result is that near-shore and onshore biodiversity is jeopardized.

Proper stewardship of the biodiversity of this nation is one of the major challenges facing our society as we enter the next century. We in the Federal government must provide constructive leadership and set an example for good management. Our ability to do so will be furthered if we develop a first class scientific capability to assist us in making decisions, and if we promote creative problem solving and cooperation, not only among Federal agencies but among other government units and the private sector. I'd like to note in this regard the important role this Committee will play in calling forth a unified Federal effort on these issues.

I am extremely concerned for our future when I note that over 700 U.S. species are now protected under the Endangered Species Act and that some 3000 more candidates are being evaluated for possible listing. While we must continue to provide support for individual species that are already endangered or threatened, and while we must commit ourselves to dealing with the backlog of candidates and providing protection to those requiring it, it is vital that we seek ways to carry on economic activity, manage our land, and steward our resources so that species, ecosystems and our very life-support systems do not continue to be put at risk.

I'd like to briefly discuss the general concept of biodiversity in order to provide a framework for discussing the Department's various programs dealing with this issue. The question of biodiversity is of recent enough vintage that the concept of biodiversity protection is often blended rather indiscriminately with broader, less precise concepts of environmental improvement or the prevention of environmental harm.

A closer look at biodiversity will show that it is a special case within the larger environmental issue, and that researching, monitoring, and protecting biodiversity requires a specialized organization of resources, involving specific techniques, programs, and expertise.

Biodiversity is a function of habitat. It can be thought of as a store of information, adaptation, and beauty which exists in the complex interaction of living organisms and their environment. It is surveyed, measured, and protected in reference to watersheds, ecosystems, and regions. It is not a "universal value" which can be maintained or enhanced without reference to specific geography. It is not clear, in fact, that the term has any meaning at all without a geographic frame of reference.

Similarly, maintenance of biodiversity is not a "generic" environmental problem which can be solved through universal measures, irrespective of the regions to which they apply. In a world in which the impacts of human activities are omnipresent, maintenance of biodiversity will require the careful management of habitat systems in the context of ongoing human use, including use of the biodiversity resources themselves.

Thus, the knowledge base required for interventions designed to maintain or enhance biodiversity will include detailed, specific knowledge of the habitat and resource systems where biodiversity is at stake. Further, it will require an ongoing ability to organize effort at the regional or even at the ecosystem level, and to meaningfully aggregate data based on disparate geographical information.

Our national biodiversity resources will be conserved most effectively by means that recognize the interrelations of natural systems and look at the whole picture, which is far more than the sum of individual parts. It is right to deal with crises involving individual species, but we should not manage our lands and resources so that we either consciously or unwittingly produce and then must react to an endless progression of crises.

I find it particularly troubling to see the Endangered Species Act invoked to deal with resource management problems on Federal lands, in wetlands, and in other areas subject to specific resource management mandates. Those mandates provide us with a strong set of tools, if we use them wisely.

At the Department of the Interior, we are beginning to explore the ways in which these existing authorities may be used to prevent the impoverishment of ecosystems that ultimately leads to endangered species listings and "last resort" recovery planning. We intend, for instance, to work with the Corps of Engineers, the Environmental Protection Agency (EPA), and other participating agencies to create a cooperative federal approach to the restoration of the Everglades ecosystem.

We are also exploring innovative approaches to recovery strategies for listed species, such as the California gnatcatcher. Our decision in that case to offer a special rule relying on the ongoing habitat conservation planning efforts of the state and local counties provides an opportunity to create a new model for federal state cooperation in the species recovery process. To date approximately 210,000 acres, or slightly over half the remaining coastal sage scrub habitat for the gnatcatcher, have been enrolled or otherwise protected through the habitat conservation plan process. This is only the first step in what will undoubtedly be a long process, but it is a step that I believe holds the hope of "re-inventing" the way we use the Endangered Species Act to protect both species and their habitats.

In Clark County Nevada, the Bureau of Land Management (BLM) has joined with county officials and officials from the City of Las Vegas, along with home builders, private conservation groups, and the U.S. Fish and Wildlife Service, in developing a Habitat Conservation plan for the desert tortoise that will allow the continued urban expansion of Las Vegas. In addition, in California, the BLM is working with officials from 10 cities and towns, four counties, 12 State and Federal agencies, and private groups to coordinate the myriad uses of both public and private lands in the western Mojave Desert that might have an impact on the tortoise.

Another such plan is moving towards completion in the Austin, Texas area. The City of Austin, Travis County, State agencies, and numerous development and environmental organizations have been actively working since 1988 to develop a mutually acceptable plan that will also meet the requirements of the Endangered Species Act. Austin has approved a $22 millon bond package to fund implementation, and the final draft was issued for public comment last October. If approved, the Balcones Canyonland Habitat Conservation Plan, covering over 600,000 acres, will permit sound development while protecting 43 listed and candidate species.

All of these plans demonstrate that it is possible under current law to protect threatened and endangered species without halting economic development. When all interested parties work together with a genuine commitment to develop solutions rather than create confrontations, we can have economic growth while protecting wildlife.

A solid scientific foundation is needed to underpin the management of endangered and threatened species, as well as to predict future trouble spots and see that they are dealt with effectively

Managing living natural resources without reference to good science guarantees future disappointment and failure.

To enhance this capability, I would like to establish a new scientific Bureau within the Department of the Interior, the National Biological Survey, that will be charged with conducting inventories and research and providing the scientific information needed to manage our resources rationally. The Survey will be able to analyze problems and develop information without science being constrained by lines of agency jurisdiction. This will enable us to make more informed and better choices about how to manage our resources cooperatively and creatively.

In our economy, science has provided the fundamental knowledge needed to develop technologies that give us the goods and services we want at lower costs. We now need to harness science in the service of our ecology as well as our economy. We need to use it to identify problems that might deny us the high quality environment we want for ourselves and our children, and use our knowledge to develop new ways to manage our resources effectively and at lower costs.

I would also like to discuss some of the other authorities available for creative and principled use in moving from crisis management to a more orderly system of sustainable resource management.

For the Forest Service and the Bureau of Land Management, the National Forest Management Act and the Federal Land Policy and Management Act provide strong requirements for management on a large part of the public lands to sustain not only human economic benefit, but also the continued functioning of ecological systems and sustenance of native species. It is my personal belief that vigorous compliance with the conservation goals and requirements of these statutes will go a long way toward avoiding the future need to list species that inhabit Federal lands.

Other Federal laws, such as the Clean Water Act, Clean Air Act, Fish and Wildlife Coordination Act, and Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), contain authorities that could be applied more aggressively to help conserve native species and natural systems.

We have all heard of the situations in which the Federal Government appears to be working at cross purposes to itself in managing its resources. I cannot promise unanimity among land-managing agencies regarding the effects of management regimes on species, but I do pledge much greater coordination of efforts both within the Interior Department and between our Department and other Federal agencies.

The Endangered Species Act mandates that all Federal agencies employ their authorities in furthering the purposes of the Act.

Surely, any reasonable interpretation of that duty should include management intended to arrest habitat and population declines before they reach the point at which the full range of the Act's protective measures become necessary. When we fail to manage affirmatively, efficiency is sacrificed, to the detriment of species and habitat; not to mention the taxpayers, who deserve better.

I would like to distinguish between two classes of problems in conserving species and their ecosystems.

The first comprises those extremely intractable environmental situations in parts of this country that challenge our ability to sustain our native biota. In many cases these are consequences of long-term, human-caused environmental changes set in motion long before endangered species became a common subject of public discourse. Some of these involve widespread habitat conversions, such as the change of most of the tall-grass prairie to agriculture, and the damming of rivers without adequate consideration for effects on anadromous fish.

We have lost our opportunity to get ahead of these problems and must use the Endangered Species Act as well as other mechanisms to attempt restoration and recovery of native species they affect. Habitat is the key, the foundation for species maintenance. If we cannot protect, restore, and enhance habitat, we cannot maintain species and we cannot maintain biodiversity.

The other class includes species conservation problems that essentially lie in the future but are predictable based on current trends. These include the loss of species that use habitat which is still largely intact, but that is planned for conversion.

Opportunities for proactive and cooperative planning were missed in the past with respect to species like the spotted owl and the desert tortoise, but opportunities present themselves today in areas where urbanization and other development are altering natural habitats. This kind of management has the potential to allocate conservation resources more efficiently and to husband the strong medicine of the Endangered Species Act for the species and situations that truly require it. We are making such an effort now in the case of the California gnatcatcher, in cooperation with other units of government and the private sector.

I also want to mention some examples of specific projects that point the way to the future in the management of natural resources:

- The Trinity River Basin Fish and Wildlife Restoration Project, which involves the U.S. Fish and Wildlife Service, Bureau of Reclamation, Bureau of Land Management, Bureau of Indian Affairs, Environmental Protection Agency, and several other Federal, State, Tribal, and local organizations, is addressing a whole suite of environmental problems in the Trinity River basin in California. The goal of the project is to restore salmon and steelhead stocks as well as other species in the basin by correcting degraded watershed conditions related to timber harvest practices, mining, and irrigation diversions. This "headwaters-to-estuary" restoration program also seeks to re-direct management to prevent future deleterious effects originating on public lands.

- The U.S. Fish and Wildlife Service, Tennessee Valley Authority, Tennessee Technological University, Virginia Polytechnic Institute, The Nature Conservancy, Department of Agriculture, EPA, local landowners and others have come together in efforts first initiated in the 1970s to improve management and protect native species in the Clinch, Powell, and Holston Rivers of Virginia and Tennessee. These watersheds are home to one of the greatest remaining concentrations of freshwater mussel diversity in the world as well as many other rare species; 20 species in the area are protected under the Endangered Species Act. The project includes monitoring studies, restoration efforts, research on species management, preparation of a strategic plan and public education efforts. The future of these watersheds and the populations that depend on them is brighter as a result.

- In the Nation's highly important coastal areas, the

U.S. Fish and Wildlife Service has been pursuing a new effort explicitly focusing on high priority watersheds and estuarine ecosystems through its Bay/Estuary Program, now established in nine critical coastal watersheds around the country. These programs incorporate all the Service's authorities that play a role in each watershed and seek to collaborate with other Federal, State, and local governments as well as the private sector. The Bay/Estuary Program intentionally was designed to address high priority coastal watersheds and ecosystems as a preventative/restorative effort to avert the need for listing species under the Endangered Species Act and to aid in ecosystem recovery.

The three examples I have cited share some features. They address important living natural resources at an ecosystem level, are based on sound science, and involve broadly shared cooperative efforts. I believe we are starting to see the future of resource management in this country, and that it involves greater development of and reliance on science in support of management, as well as a greater coming together of individuals, groups, and organizations to achieve sustainability in natural systems.

Again, Mr. Chairman, I appreciate the opportunity to appear before the Committee today to address the biodiversity issue. I'm looking forward to working with you on a variety of issues that will be important to biodiversity management over the coming years. This

Committee will play a key role and I expect this hearing is but the first of many productive discussions we will have on this important array of issues. I will now be pleased to respond to questions.

STATEMENT OF
THE HONORABLE MIKE ESPY
SECRETARY
UNITED STATES DEPARTMENT OF AGRICULTURE

Before the
Committee on Merchant Marine and Fisheries
United States House of Representatives

How To Improve the Nation's Efforts To Conserve Our Biological Resources and Important Habitats and Ecosystems

April 1, 1993

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

I welcome this opportunity to appear before you today along with my colleagues and friends Secretary Babbitt and Administrator Browner to give you my vision of the role the Department of Agriculture (USDA) will play as the Clinton Administration charts a new course in our efforts to protect and conserve our precious natural resources.

It is my intent to ensure that USDA works with the Department of the Interior and the Environmental Protection Agency to conserve biodiversity. We have learned that efforts to protect the Northern Spotted Owl and old-growth ecosystems were greatly complicated because different Federal agencies took different, and sometimes, conflicting positions on management strategies. The President has clearly stated that this lack of policy coordination must end. We at USDA are committed to that purpose. A good example of this approach is President Clinton's forestry conference, in which our three organizations will be participating tomorrow in Portland.

Today, I would like to discuss the role that USDA can and will play in promoting conservation and stewardship of the forest, range, and croplands of the United States, with particular focus on our role in maintaining biodiversity.

I believe USDA can play a unique and critical role in the conservation of biological diversity. The Forest Service manages 191 million acres of forests, rangelands, and grassslands in the National Forest System. Together with the Department of the Interior, we serve as our Nation's ecological "bank."

Just as our society is strengthened and made rich by the diversity of our citizens, so it is with our natural environment. A wide diversity of plant and animal species thriving in their natural habitat is an indication of a strong and healthy environment.

In recent years, the concept of biodiversity has come to the forefront as one of the most important issues in natural resource management. Although there are many different thoughts on what biodiversity is, it is generally concluded that biodiversity is maximized in diverse natural communities containing a variety of plant and animal species. Diverse plant and animal communities tend to be more resilient and ecologially stable. Modifying these systems can lead to unknown and undesirable consequences, if not done thoughtfully based on sound scientific principles.

We all realize that farming, ranching, mining, and a host of other human activities can affect biodiversity. While we can no sooner abandon farming and commodity production than stop breathing, our programs can be designed to maintain biodiversity as well as produce such things as timber, crops, and livestock. Experience teaches us that the most practical way to accomplish this is to attend first to the land, and to take a more holistic approach in managing the land and resources it supports.

How we use the land affects biological resources and important habitats and ecosystems in many ways. Over time, many land use activities can damage the value of soil and water resources. For example, monoculture farming (growing the same crop on a large acreage in the same field year after year) sharply reduces the diversity of plant cover. It reduces landscape diversity and may eliminate winter cover, nesting areas, and food plants for many wildlife species. Draining wetlands to grow crops can reduce breeding areas for waterfowl and other wildlife. Overgrazing results in less food and cover for wildlife, which must then compete more intensely with each other and with domestic livestock for the food and cover that remains. These same practices contribute to increased flooding and sedimentation, poorer water quality, degradation of fish habitat, and loss of the soil's productive capacity.

As we are all aware, nature does not recognize political or jurisdictional boundaries. This is but one reason why it is so important to have the various Federal agencies singing from the same hymnal. In addition, it points to the need to establish cooperative relationships with state and private land owners.

USDA Leadership in Conservation

The USDA has a long and proud tradition in leadership in conservation and forestry and we will continue to play a central role in the future.

We are beginning to realize the importance of protecting biodiversity across the landscape and on a watershed basis.

The Soil Conservation Service has an important role to play in improving management of ecosystems and biodiversity. As a source of technical support to farmers, ranchers and others, SCS provides leadership in tackling tough issues like nonpoint source pollution, wetland protection, and watershed restoration and management mainly on non-Federal, agricultural lands. Land users work with nearly 3,000 locally organized and locally run conservation districts in the United States. This delivery system and the traditional role of providing assistance to private land users makes SCS a key to fostering the Nation's efforts to conserve biological resources and important habitats on private lands.

The Agricultural Stabilization and Conservation Service (ASCS) programs provide substantial cost-share and other financial incentives to aid farmers in making land and water conservation investments. Through the Conservation Reserve Program, ASCS has helped farmers protect over 35 million acres of highly erodible and other environmentally sensitive cropland. Seventy-five percent of the 50,000 acres approved for restoration in the first year of the Wetlands Reserve Program are in endangered species recovery plans, will directly benefit endangered species, or lie within ongoing Federal or State wildlife project areas.

In addition, the natural resource program of the Extension Service has provided valuable information and assistance to thousands of farmers, ranchers, and woodland owners to guide them in making environmentally-sound management decisions.

The Forest Service has a wealth of resources and expertise to bring to bear on matters related to the conservation of biodiversity within the United States and internationally.

The Forest Service remains the only Federal land resource agency with a clear mandate to manage its lands to conserve biological diversity. The National Forest Management Act of

1976 requires the Forest Service to "... provide for diversity of plant and animal communities based on sustainability and capability of the specific land area."

Fully half of the Nation's softwood timber, big game, and cold water fisheries originate on National Forest lands. Over 75 percent of the water in the West has its source on National Forest land. And just under one-third of the currently listed threatened and endangered animals and plants are located on National Forest lands.

Just last year, Forest Service Chief Dale Robertson announced the Agency's commitment to ecosystem management. With this approach we intend to apply scientific knowledge of the way in which all of the important components of the ecosystem fit together to better guide resource management.

One example of the Forest Service's effort is the sensitive species program entitled "Every Species Counts." This is a proactive management effort to head off the need for future threatened and endangered listings. The program provides the foundation upon which to build an ecosystem approach to evaluating habitats that may be at risk, and to ensure that management activities do not allow a decline in the habitat of identified species. Our ecosystem approach might be likened to "preventive medicine," rather than intensive care treatment of a patient in critical condition.

The research program of the Forest Service is particularly key in maintaining diverse ecosystems across the United States and abroad. It also illustrates one of the strengths that we can bring to the new Federal conservation partnership. Knowledge is critical to success in managing our natural resources. Forest Service research provides that knowledge for many Federal and State agencies engaged in managing and protecting healthy ecosystems.

In addition, the International Forestry Program is rapidly becoming the world leader in providing scientific and technical support for international resource management programs.

Improving USDA's Conservation and Forestry Programs

As part of our effort, we must commit the resources needed to monitor our actions and to measure our progress over time. Strategies like ecosystem management and watershed planning are for the long term. We must establish the capability to accomplish what we set out to do, and take corrective measures when it appears that we have strayed off course. Benchmarks to measure our progress are also needed in this period of fiscal restraint to make sure the American taxpayer is getting the biggest bang for the buck.

But the truth is, our knowledge of ecosystem functions is still quite limited. Even the best scientific research is often not much more than interim conclusions drawn from incomplete data, and the scientists will tell you that.

This points out the need for intensive research and monitoring. It also points out why management must be sufficiently flexible to be able to change as our scientific information changes. To this end, we must strengthen the link between research and management so that our policies have a strong scientific foundation.

Another concept that should guide our conservation and forestry programs is the concept of sustainability. Management strategies--be they for agricultural land or forests--can only be effective if they lead to sustainable production of the goods and services which the land provides. Sustainable production, in turn, can provide the basis for sustaining the economies of rural communities and provide them with a more certain future.

The Forest Service has played an active role in developing the science and maintaining the conservation of biodiversity at a regional, national, and international level. Our participation began with the 1989 Keystone Dialogue which heightened national attention to biodiversity. From there, the Forest Service chaired the 1992 International Sacramento Conference on Biodiversity in Managed Landscapes and is currently editing the conference proceedings. Also in 1992, the Forest Service represented the Department of Agriculture in preparing for the

United Nations Conference on the Environment and Development, held in Rio de Janeiro, Brazil. As a followup to these efforts, the Forest Service will hold an agencywide workshop to identify strengths and limitations for conducting research and managing for biodiversity.

Summary

In closing, let me say that I am committed to a new partnership among the Federal agencies to conserve our biological resources. The strength of a good partnership comes from the individual strengths that each member brings to that partnership. I believe USDA brings many strengths to this new conservation partnership and has the capability to move aggressively to deal with many of the natural resource and environmental problems facing our Nation in concert with the Department of the Interior, the Environmental Protection Agency, and the National Marine Fisheries Services in the Department of Commerce.

We must seek balanced solutions to the complex natural resource management issues facing us. We have the resources, the professional expertise, and the will to get the job done. Let's move forward and do it.

STATEMENT OF CAROL M. BROWNER
ADMINISTRATOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
before the
COMMITTEE ON MERCHANT MARINE AND FISHERIES
U.S. HOUSE OF REPRESENTATIVES

APRIL 1, 1993

Mr. Chairman and Members of the Subcommittee: I am grateful for the opportunity to appear here today with colleagues Secretary Babbitt and Secretary Espy. The fact that leaders of several Federal agencies are testifying together underscores both the complexity of the problem we face, and the importance of Federal interagency cooperation in solving it. No single agency is capable of protecting biological diversity and natural habitat. No single law gives us the tools necessary to achieve those ends. Rather, all the relevant Federal agencies, together with state and local governments, tribes, businesses, environmentalists and the public, will have to join hands and apply the full range of tools at our disposal, if we are to protect and nurture these invaluable resources.

The Environmental Protection Agency, in partnership with our fellow Federal agencies, has a vital role in protecting biological diversity and ecosystems. When EPA was established in 1970, it was premised on the perception that the environment is "a single, interrelated system." Many of the laws that we administer, like the Clean Water Act and the Federal Insecticide, Fungicide, and Rodenticide Act, clearly contribute to the protection of species and ecosystems. Whenever EPA has acted to control acid rain, clean up waste sites, construct sewage treatment plants, or prohibit the use of certain pesticides, we have -- implicitly or explicitly -- helped preserve biological diversity and natural habitat.

Yet, clearly, we have to do more. Despite our demonstrable successes --like reducing the sulfur emissions that lead to acid rain, reducing flows of nitrogen and phosphates into surface waters, and banning the use of DDT -- natural habitat in this country is still seriously stressed. From the mudflats of the Pacific Northwest, to the tall grass prairies of the Midwest, to the Everglades of my own home state of Florida, natural ecosystems are under siege. And thousands of species that depend on them are stressed at best, and threatened with extinction at worst.

What we are seeing in this country is happening around the world at alarming rates. Prominent scientists now are predicting that as much as 20 percent of total global biodiversity may be extinct within the next 30 years, if current rates of habitat destruction continue.

Because of the ongoing degradation of natural systems in this country, EPA is placing more emphasis on the protection of habitat -- both for its own sake, and because of its role in protecting the quality of human life. This is exactly the advice given to EPA by the Science Advisory Board (SAB) in its 1990 report, Reducing Risk. The SAB's recommendations are based on a belief that ecosystems, and the biological diversity they support, have an intrinsic value beyond their direct utility to humans. At the same time, the health of humans and the health of ecosystems are inextricably linked. As the SAB wrote in their report: "...there is no doubt that over time the quality of human life declines as the quality of natural ecosystems declines."

There are many opportunities in our programs to foster the health of ecosystems. We have established Environmental Monitoring and Assessment Program (EMAP) to measure trends in the health of ecosystems and anticipate emerging threats. We have undertaken several initiatives targeted at specific geographic areas, focusing protection on the entire ecosystem, like the Gulf of Mexico, the Chesapeake Bay and the Great Lakes. The watershed approach is becoming a top priority in our water program. Under the Clean Water Act EPA oversees the States in establishment of and compliance with water quality standards, including standards designed to protect aquatic life. The Act contains other provisions that relate to aquatic life, including designation of Outstanding Natural Resource Waters of exceptional ecological significance, to which special protections apply. As a part of the National Estuary Program, EPA coordinates development of conservation and comprehensive management plans to restore and protect the water quality and ecological resources of significant estuaries.

These initiatives and others like them involve partnerships among Federal agencies, state and local governments, and non-governmental organizations at the ecosystem level. They can benefit immensely from the coordinated support of strengthened leadership of the Federal agencies here today. The Clinton Administration is committed to that coordinated approach.

In addition, we are developing a process for assessing ecological risks much like the process we use for assessing human health risks. Ecological risk assessment will help us identify problems, set priorities, and provide a scientific basis for decisions. While not an exact science, ecological risk assessment will help formalize ecosystem concerns throughout EPA.

We will review EPA programs for further opportunities to develop strategic options for protecting species and habitat in the course of carrying out our statutory responsibilities. We will find ways for EPA offices, both here in Washington and out in the regions, to incorporate ecological components into their ongoing programs. Perhaps most important, we will identify opportunities for cooperation with other Federal agencies, state governments, and private organizations.

Interagency cooperation, Federal/state cooperation, and public/private cooperation are all essential to our national effort to preserve habitat and nurture biodiversity. All of us have responsibilities that pertain to ecosystem protection; all of us have tools that can be used for that end. To be successful, we have to coordinate our actions, leverage our resources, and combine our expertise in ways that are most effective for specific ecosystems. While I am Administrator of the Environmental Protection Agency, that is exactly what I intend to do.

All Federal agencies need to join forces and form alliances to protect our most important turf, the natural ecosystems that sustain all forms of life on earth, including humanity.

This new approach should be the linchpin of national policy regarding biological resources. The Federal Government needs to protect the biological systems within which species exist. We need to rethink the economic activities that threaten habitat. We need to find new ways of achieving our economic goals while at the same time preserving and protecting the natural ecosystems that make all life -- including human -- possible.

I believe we can be successful, especially if Federal agencies like the ones we represent do a better job working together for a common end. I am confident that in the Clinton Administration we will.

Thank you.

The Resources Agency
of California

Pete Wilson
Governor

Douglas P. Wheeler
Secretary

California Conservation Corps • Department of Boating & Waterways • Department of Conservation
Department of Fish & Game • Department of Forestry & Fire Protection • Department of Parks & Recreation • Department of Water Resources

TESTIMONY
OF
MICHAEL A. MANTELL
UNDERSECRETARY FOR RESOURCES

U.S. HOUSE OF REPRESENTATIVES
MERCHANT MARINE
AND
FISHERIES COMMITTEE
HONORABLE GERRY STUDDS, CHAIRMAN

APRIL 1, 1993

Thank you Mr. Chairman and members of the Committee. I appreciate the opportunity to be here.

I want to talk with you about California and how I think the initiatives and programs of the State fit into the national context of the debate over biological diversity and the protection of endangered species. There are 58 counties in the State of California. Each of these counties has at least one species listed either under the state or the federal Endangered Species Act. There are more than 125 federally listed species in the State. More than one-third of the candidate species identified by the U. S. Fish and Wildlife Service (USFWS) for the entire United States reside in California. And the settlement late last year by the U.S. Department of the Interior of a lawsuit with various environmental and animal welfare groups committed the Department to a process of moving toward listing 400 Category I candidate species over the next four years, 162 of which reside in California.

At the same time, California's population, which stands at 31 million people, is projected to be 41 million people by the year 2010. Even in the midst of the greatest economic recession since the 1930's, the state grew by over 640,000 people in 1992.

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Energy Resources Conservation & Development Commission • San Francisco Bay Conservation & Development Commission
State Coastal Conservancy • State Lands Commission • State Reclamation Board

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Every conceivable area in California is currently affected by a major species issue. We have the Northern Spotted Owl and Marbled Murrelet in the timber regions of the north and the California Spotted Owl across the Sierra Nevada Range. We have the Delta Smelt, the Winter Run Chinook Salmon, and other aquatic species in the Delta Estuary of the Central Valley, which is the hub of the state's water delivery system. And in southern California, the Gnatcatcher and the Cactus Wren (two small birds) are affecting agricultural and land development activities.

Thus, with California blessed with rich biological diversity, a high rate of species endemism and a rapidly growing population, endangered species issues are understandably very much in the forefront.

I think that the debate over the next year or so on the federal Endangered Species Act has to account for a number of important factors:

- One is the scientific advances that have been made in the 20 years since the enactment of the modern day Endangered Species Act of 1973. These are scientific advances not only in terms of notions about biological diversity, but also in terms of tools such as computerized geographic information systems, gap analysis and so forth.
- Two, the debate has to take into account the sobering fiscal realities that exist at all levels of government, most especially among State and local governments. We simply have to find new ways of solving problems and reconciling legitimate needs if we are to serve the public effectively.
- Finally, the debate needs to take account of an honest recognition of what has and what has not worked well over the past 20 years and the heightened public expectations which exist to solve problems, rather than to cast blame.

Within these factors of the debate, any future legislative action on endangered species and biological diversity must be guided by three principles:

1) Prevention. Anticipatory approaches need to be at the heart of the future efforts. We cannot wait until we are at the crisis stage on these issues, until species are akin to being on their dying breaths and the only option left is artificial resuscitation.

2) We need to take a broader ecosystem focus. The species-by-species, project-by-project, site-by-site focus embodied in the Endangered Species Act simply does not take into account scientific or jurisdictional realities.

3) Locally-based processes provide the most promising opportunity for resolving these issues. It's at the local level where decisions are made day-in and day-out about how land is used through a myriad of zoning and land permitting decisions. We have to better incorporate decision making about wildlife needs and environmental needs into local processes if we are ultimately going to be successful in reconciling economic realities and legitimate environmental objectives before they become crises.

I will elaborate on these three principles by illustrating the experiments that we are trying in California.

Biodiversity MOU

The State of California in cooperation with federal and local government has launched a new biodiversity conservation effort to help stem the disappearance of many of California's rare plants and animals and better coordinate these concerns and incorporate them into local and regional planning efforts. This effort recognizes the inherent limitations of the traditional single-species approach to maintaining biodiversity and accommodating economic development.

On September 19, 1991, the directors of ten state and federal agencies, including the University of California, signed the Memorandum of Understanding (MOU) on "California's Coordinated Regional Strategy to Conserve Biological Diversity", a copy of which is appended to this testimony. The MOU established a statewide biodiversity Executive Council to coordinate interagency actions at the statewide level and to foster new local efforts to solve regionally unique problems. The council was originally composed of the signatories to the MOU and is chaired by California's Secretary for Resources, Douglas P. Wheeler.

In 1992, additional governmental parties agreed to the MOU, greatly expanding the Council's scope and bringing the total number of signatories to 26. Probably the most significant expansion of the Council has been the addition of six county representatives, mostly current county supervisors, representing six regional associations of county supervisors. Their voice is critical to the Council's success. They represent local interests and are the only elected officials on the Council.

The MOU does not modify or supersede the existing statutory direction of the signatories. The Executive Council agencies are still bound by the National Environmental Policy Act (NEPA), relevant state and federal law. The MOU does promote interagency, inter-governmental, and local cooperative efforts to best conserve California's enormously varied biodiversity using existing laws and institutions.

Both statewide and regional efforts are now underway as a result of the biodiversity MOU. At the State level we are beginning work on resources inventory and finding ways to make new data and technologies available across governments, especially at the local level.

On a bioregional level, a Sierra Nevada Summit Steering Committee composed of diverse interests was formed to better understand the resources and economic needs of that unique area. This committee has developed an initial strategy to ensure maintenance of the biological and economic capital of this most important mountain range. For example, efforts are underway in this region to catalog and distribute known information about the Sierra Nevada. The University of California's Wildland Resources Center has been engaged to lead an effort involving scientists, land managers, and local leaders to identify important gaps in our knowledge of the Sierra Nevada ecosystem and to develop strategies to fill these gaps. The California Association of Resource Conservation Districts and its member districts in the region are developing ways to apply this information and existing governmental institutions to the conservation of biodiversity in the Sierra Nevada.

On the north coast, where efforts to conserve the northern spotted owl have polarized many communities, regional efforts are beginning to promote conflict resolution through locally developed strategies to conserve biodiversity while fostering local economic development. Under contract with the California Department of Forestry and Fire Protection, University of California Extension has been convening local meetings throughout the region. Divisions are deep, but people are talking again. These forums have focused on sensitive issues such as balancing private property rights and the conservation of biodiversity.

Natural Communities Conservation Planning

The most far-reaching of these efforts is occurring in southern California under the auspices of Natural Community Conservation Planning (NCCP). NCCP is an explicit attempt to get ahead of the curve of single species listings and all the population growth that is coming to state.

Under the leadership of Governor Pete Wilson, the Legislature created and gave authority for the NCCP program in October, 1991. Section 2080 et. seq. of the California Fish and Game code authorizes the State's Department of Fish and Game to work collaboratively with landowners, local governments, conservationists and others on broad natural community or ecosystem planning efforts in advance of or in conjunction with single species listings programs. (A copy of the legislation is attached to this testimony.)

The intent of the NCCP effort is not that it be a substitute for listings: in fact, a strong Endangered Species Act is essential to making it work. The Endangered Species Act, with the threat of an impending species listing, provides the incentives for the parties to sit down together and work on broad-based natural communities conservation plans. The NCCP is intended to provide an additional, supplemental tool to the Endangered Species Act and an anticipatory, preventive approach to wildlife conservation efforts.

But the NCCP program is a recognition that the Endangered Species Act, whether at the State or Federal level, cannot do it alone, and that we've learned much in the last 20 years. It is our hope that California with this experiment will lead the way, much as it did in the late 1970's and early 1980's with habitat conservation planning on San Bruno Mountain that led to the amendments authorizing habitat conservation planning to the Endangered Species Act in 1982. We are appreciative that Secretary of the Interior Bruce Babbitt has recognized the NCCP effort in California as a potential national model in the recent listing decision under the ESA on the California Gnatcatcher.

NCCP Coastal Sage Scrub Pilot

As some of you may know, we applied the broad authority for Natural Communities Conservation Planning on a pilot basis to the coastal Sage Scrub habitat of southern California. This habitat type has about 200,000 to 300,000 acres in five counties: Orange, Riverside, San Diego, San Bernardino and Los Angeles.

We selected this area for several reasons. One is that this habitat is home to some 50 to 60 potentially threatened or endangered species that are likely to come up for listings over the next 10 to 20 years, including the Gnatcatcher and the Cactus Wren. The habitat is seriously fragmented in terms of its historical level, with some 60-90 percent of it lost or significantly altered.

We also applied it here because there were already some innovative and multiple species planning efforts underway in the region that we wanted as a State to reinforce, to stimulate, to foster. Because of the threat of so many listing decisions, there was tremendous landowner and local government interest in coming up with a preventive, collaborative planning process. Finally, it was our sense that if we could make some strides here in this fast growing region; where some of the most expensive real estate exists in the country; where there are tremendous development pressures; and where there are so many jurisdictions, that we could expand it and broaden its application to other parts of the state.

The end result of the pilot NCCP effort, we hope, is that starting in late fall of this year there will begin to be plans carefully worked out between local governments, landowners, and conservationists that will meet the approvals of our state Department of Fish and Game and the U.S. Fish and Wildlife Service. We hope that this plan will also simultaneously avert the need for future listings of other species that reside in the same habitat area.

I would like to briefly review with you some of the steps that we've taken thus far trying to get from the concept to the reality of implementing the program.

MOU With Fish and Wildlife Service

In December of 1991, the State signed a Memorandum of Understanding with the Fish and Wildlife Service to engage in the NCCP as a collaborative federal-state effort. (See document attached.) While State law now allows the Department of Fish and Game to get into a preventive, anticipatory mode, the Federal law is not as explicit. Our Memorandum of Understanding enables the Federal government to be involved in this, commits them to work with us and use the scientific material that is coming out of this process, and commits the federal government to providing some funding for this effort, which they have. This Memorandum has been referenced in the proposed special rule issued by the USFWS on listing the Gnatcatcher as a "threatened" species.

Scientific Review Panel

Early on, we established a Scientific Review Panel--chaired by Dr. Dennis Murphy of Stanford and composed of four other distinguished conservation biologists--because we felt that any effort here had to be scientifically based. The Scientific Review Panel (SRP) has identified the program's entire study area, which amounts to approximately 6,000 square miles based upon the needs of the habitat and the species within it, to ensure the long-term viability of the habitat. They analyzed existing data, found it wanting, and issued new field data survey guidelines. They have completed analyzing the extensive data submitted thus far, and will soon be publicizing conservation guidelines that will be used in the planning efforts and as the basis for interim "take" under the Gnatcatcher listing.

Advisory Committee

We set up an advisory committee--facilitated by the California Environmental Trust--composed of landowners, local governments and environmental interests, to ensure inclusiveness and active participation by all the groups.

Landowner and Local Government Participation

We established a system of voluntary enrollments by local governments and landowners to insure participation and systematic field surveys, and that conservation options would not be foreclosed during the planning process. The enrollees, both private landowners and public agencies covering both their landowner and regulatory capacities, commit to scientific surveys of land within their jurisdiction, and commit to certain restrictions or actions regarding activities on their lands during the interim period so that conservation options will not be foreclosed.

The key issue for the environmental community (and a bone of significant contention) has been the degree of interim controls which are in place. That community has sought tighter controls on land activity during the planning process to insure that options were kept opened. The State attempted to reach a balance between the need for administrative workability in order that attention could be focused on actual long-term planning and protection with the needs to ensure that the habitat and the affected species are not disrupted by too much activity during the planning process. The Federal listing decision on the California Gnatcatcher last week should help to quiet the debate on this particular issue.

The degree of participation in the NCCP from a national perspective has been unprecedented. Virtually all eligible habitat has been enrolled in Orange and San Diego Counties, including military lands such as the Marine Corps' Camp Pendleton. We were less successful in the other counties. However, with the listing decision on the Gnatcatcher, we are hopeful about being able to include these areas into the pilot program as well.

Planning Subregions

Based upon scientific principals, we arrived at planning subregions, which are now at work. We divided the area into 10 or 15 planning subregions that are actually now focused at the county level to work on long-term actual planning efforts.

(See attached description of Planning Subregions.)

Support and Training

We are appreciative of the support the National Fish and Wildlife Foundation, among others, has given to this effort, especially in terms of the Scientific Review Panel. We recently conducted a course with the University of California at Davis on "Land Use Law and Land Use Planning" for Federal and State wildlife officials in order to give these people greater awareness of what goes on at the local level in terms of land use planning, zoning, and permitting and to qualify them to more effectively fit wildlife considerations into these decisions. They must have a better appreciation about how State and local land use processes work if they are going to get them to be early and effective participants at the table.

Future Needs

We will need substantial technical and financial assistance from our federal partners if these anticipatory, ecosystem-focused endeavors that foster economic development are to be furthered and ultimately successful. We are encouraged by recent conversations with the Department of the Interior in their recognition of this reality. These preventive strategies offer much hope in not only solving problems, but also in saving long-term costs. Yet we are charting new scientific and policy frontiers that translate into new skills, working relationships and technology that will require new start-up staff and funding commitments from the federal government for them to achieve their potential.

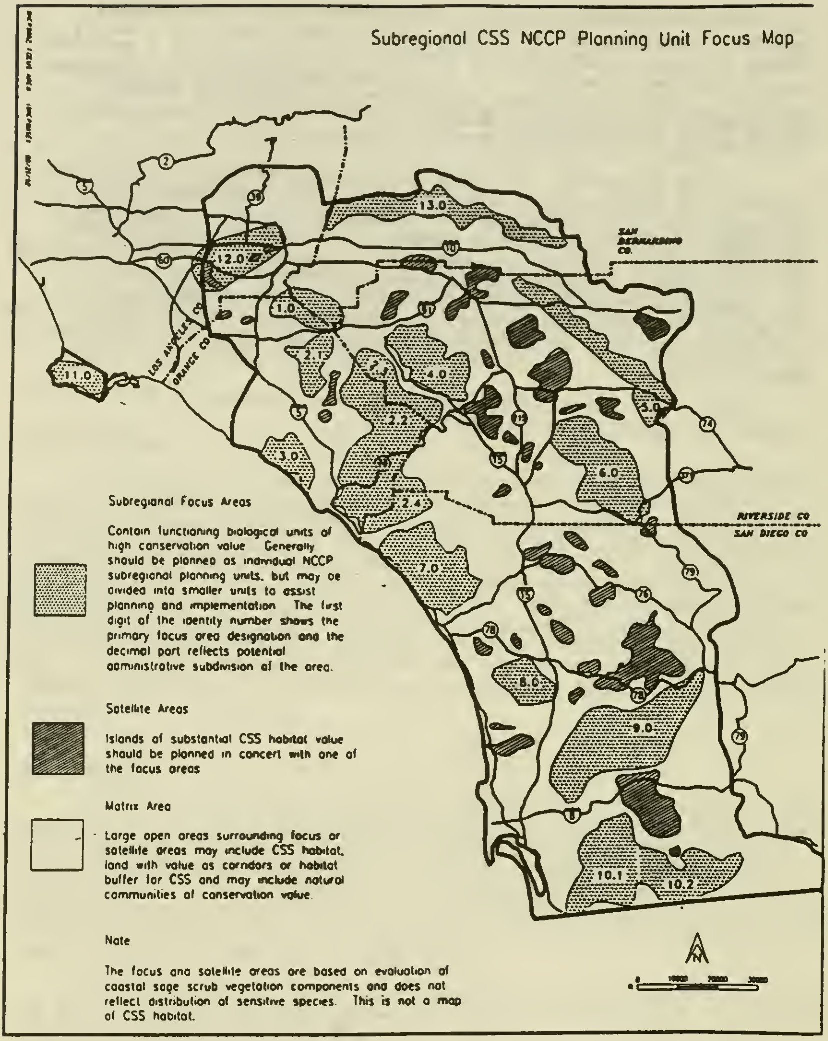
Conclusion

These are pilot programs and experiments. They are not a panacea, but we think that they, especially the NCCP effort, hold great promise in terms of locally-based collaborative planning, long-term habitat conservation, and the promotion of economic development. With regard to the Endangered Species Act, we hope this program will help inform your thinking about what goes into the future efforts in terms of species and assisting states that want to pursue innovative approaches.

To meet both wildlife conservation and economic objectives, we must institutionalize these concerns more effectively at other levels of government, particularly at the local level. The Federal government cannot do it alone. Moreover, the future conservation of many of our public commons--be they parks, species, wildlife or waterways--will depend upon our ability to engage private landowners in conservation efforts to a greater extent than ever before. It is evident that resource programs are more likely to succeed when they can enhance a sense of stewardship and ownership felt by private citizens and enlist their support in managing these resources.

In the long run, if we are to achieve tangible results in reconciling the needs of wildlife and other resources with economic activity, avoidance of litigation should be a goal of both the private and public sector. Preventive, cooperative planning based on sound science, while perhaps as time consuming as litigation, is often focused on constructively solving problems more than it is on exacerbating controversies. It is this that Governor Wilson and his Administration are trying to do in California, and we hope that it has some lessons that are of use nationally.

Thank you for this opportunity, and I would be pleased to answer any questions you may have.



Subregional CSS NCCP Planning Unit Focus Map

░ Subregional Focus Areas

Contain functioning biological units of high conservation value. Generally should be planned as individual NCCP subregional planning units, but may be divided into smaller units to assist planning and implementation. The first digit of the identity number shows the primary focus area designation and the decimal part reflects potential administrative subdivision of the area.

▨ Satellite Areas

Islands of substantial CSS habitat value should be planned in concert with one of the focus areas

☐ Matrix Area

Large open areas surrounding focus or satellite areas may include CSS habitat, land with value as corridors or habitat buffer for CSS and may include natural communities of conservation value.

Note

The focus and satellite areas are based on evaluation of coastal sage scrub vegetation components and does not reflect distribution of sensitive species. This is not a map of CSS habitat.

MEMORANDUM OF UNDERSTANDING

California's Coordinated Regional Strategy To Conserve Biological Diversity

"The Agreement on Biological Diversity"

September 19, 1991

I. Preamble

California is one of the most biologically diverse areas in the world. The state's rich natural heritage--vegetation cover and distribution, wildlife and fish habitat, recreation and aesthetic values, water and air quality--provides the basis for California's economic strength and quality of life. Sustaining the diversity and condition of these natural ecosystems is a prerequisite for maintaining the state's prosperity.

Public agencies, private organizations, and individual citizens have long shared a commitment to conserving the natural environment of their state. Laws, policies, and programs already in place protect many elements of California's natural heritage. That experience, and a growing body of scientific research, demonstrate the need to move beyond existing efforts focused on the conservation of individual sites, species, and resources. Californians now recognize the need also to protect and manage ecosystems, biological communities, and landscapes.

These broader systems represent an important component of the state's biological diversity--the full variety of living organisms in California, the genetic differences among them, and the communities and ecosystems in which they occur. These ecological systems appear throughout the state across a variety of ownerships and jurisdictions. To effectively conserve California's biological resources and maintain social and economic viability, public agencies and private groups must coordinate resource management and environmental protection activities, emphasizing regional solutions to regional issues and needs.

II. Purpose

This Memorandum of Understanding establishes an Executive Council to develop guiding principles and policies, design a statewide strategy to conserve biological diversity, and coordinate implementation of this strategy through regional and local institutions.

III. Policy and Principles

This memorandum recognizes the following set of policies and principles.

A. The signatory parties agree to make the maintenance and enhancement of biological diversity a preeminent goal in their protection and management policies. Furthermore, they agree to work with the Executive Council to develop and adopt a coordinated regional strategy that ensures protection of biological diversity and the maintenance of economic viability throughout California.

B. The basic means of implementing the strategy are to be improved coordination, information exchange, conflict resolution, and collaboration among the signatory parties. In addition, the signatories agree to pursue the development of local and regional institutions and practices necessary to conserve biological diversity. These tools may include the establishment of mitigation and development banks, planning and zoning authorities, land and reserve acquisition, incentives, alternative land management practices, restoration, and fees and regulation.

C. Community and public support are vital to the success of a bioregional program. Human communities, local economies, and private property are important regional attributes to be maintained. As a consequence, signatories will develop procedures and guidelines to facilitate public education, dialogue and participation, and to minimize the disruption of human communities and expectations. Public lands are to be given first preference as reserves and conservation areas. Impacts on private lands will be minimized to the degree possible.

D. Biological diversity is to be viewed as an attribute of natural processes operating at the landscape, ecosystem, species, and genetic levels. These processes are dynamic varying over time and space. A recognition is made that these processes are altered by both human and natural factors. While the focus of the agreement is on biologic factors, abiotic elements are also recognized as important components of natural systems. The signatories agree to pursue the establishment of measurable baselines and standards of diversity as a means of conserving biological resources over time.

E. Given the changing characteristics of both the biological and social environment, the signatories agree to an adaptive approach in the development of bioregional strategies. Such an approach will place substantial emphasis on monitoring, assessment, and research programs. These programs will help determine if strategies are accomplishing their intended objectives, maximize the opportunities to learn from experience, and enhance flexibility in the face of new knowledge.

IV. Authority

This Memorandum does not modify or supersede existing statutory direction of the signatories.

V. Organization

A. Statewide Executive Council - The Executive Council is to be chaired by the Secretary of The Resources Agency of California and made up of the principal signatory agencies. The Council will set statewide goals for the protection of biological diversity, recommend consistent statewide standards and guidelines, encourage cooperative projects and sharing of resources, and cooperate in the following program areas:

1. Biodiversity-related policies and regulations;
2. Land management, land use planning, and land and reserve acquisition and exchange;
3. Private landowner assistance;

4. Educational outreach, public relations, and staff training;
5. Monitoring, inventory, and assessment;
6. Restoration; and
7. Research and technology development.

The Council will seek adequate funding to implement regional strategies and to develop necessary state and regional institutions, such as trading and mitigation banks. Further, the Council will cooperate with regional representatives to define the boundaries of bioregions and to help to establish Bioregional Councils.

The Council will meet quarterly to review progress in accomplishing its mission. Representatives of other state and federal agencies and sponsors will be invited to participate in the meetings of this group. The Council will produce and distribute to the public regular summaries of its activities.

B. Sponsors - A sponsor may be any special interest group or organization that supports the purpose and intent of this Memorandum of Understanding. Sponsors will be expected to promote the development and adoption of biodiversity strategies and principles through their membership and activities. Sponsor representatives are to be invited to attend and participate in any Executive Council meeting or activity. Sponsorship should help enhance consensus and participation in the adoption of bioregional strategies.

C. Bioregional Councils - Regional administrators of signatory agencies will develop regional memoranda of understanding with the purpose of establishing Bioregional Councils. Participation of additional organizations specific to each region, such as county governments and local environmental and industry groups, will be encouraged. The Councils will develop regional biodiversity strategies that incorporate the policies, principles, and activities listed above under the mission of the Executive Council. Regional solutions to regional issues and needs will be encouraged, consistent with statewide goals and standards. The Councils are to work with regional and local authorities to implement biodiversity policies. In addition, Bioregional Councils will actively encourage the development of watershed or landscape associations to assist in implementing regional strategies.

D. Watershed and Landscape Associations - Local staffs of signatory agencies will encourage the participation of local public, landowner, and private organizations in the formation of watershed or landscape associations. These associations will be encouraged to develop specific cooperative projects that help to achieve regional and statewide objectives. Use of Coordinate Resource Management Planning process will be encouraged. The local associations are to be a primary forum for the resolution of local issues and conflicts related to biodiversity concerns.

VII. Modifications

This agreement is to remain in effect until modification by the parties in writing; it is negotiable at the option of any one of the parties.

Douglas Wheeler
Secretary
The Resources Agency

Pete Bontadelli
Peter Bontadelli
Director
California Department of
Fish and Game

Richard A. Wilson
Director
California Department of Forestry
and Fire Protection

Henry Agonia
Director
California Department of Parks
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California State Director
USDI Bureau of Land Management

Ronald E. Stewart
Ronald Stewart
Regional Forester
Pacific Southwest Region
USDA Forest Service

for Marvin L. Plenert
Regional Director
USDI U.S. Fish and Wildlife
Service

Stanley T. Albright
Stanley Albright
Regional Director
Western Region
USDI National Park Service

for Kenneth R. Farrell
Vice President, Division of
Agriculture and Natural Resources
University of California

MEMORANDUM OF UNDERSTANDING
BY AND BETWEEN
THE CALIFORNIA DEPARTMENT OF FISH AND GAME
AND
THE UNITED STATES FISH AND WILDLIFE SERVICE
REGARDING
COASTAL SAGE SCRUB NATURAL COMMUNITY CONSERVATION PLANNING
IN SOUTHERN CALIFORNIA

This Memorandum of Understanding (MOU) implements a policy of coordination and cooperation by and between the California Department of Fish and Game (Department) and the United States Fish and Wildlife Service (Service) regarding the development of conservation strategies for effective, long-term protection of the Coastal Sage Scrub natural community and its associated sensitive species in southern California.

WHEREAS:

1. Published estimates indicate that 85 to 90 percent of Coastal Sage Scrub in California has been lost as a result of urban and agricultural development.

2. There are 13 species of animals and plants associated with Coastal Sage Scrub that are on either State or Federal lists of endangered, threatened or rare species.

3. The Service has proposed the coastal California gnatcatcher (*Polioptila californica californica*) for Federal listing as an endangered species.

4. Fifty-six additional species of animals and plants associated with Coastal Sage Scrub are considered to be sensitive, including over 30 species that are candidates for Federal listing.

5. California's human population has soared and is expected to reach over 40 million by early in the next century.

6. The decade of the 1990s poses unprecedented challenges to Federal, State and local agencies responsible for conserving Coastal Sage Scrub in southern California.

7. Ecologically sound conservation actions must be implemented in order to give long-term protection to the remaining Coastal Sage Scrub habitats in southern California.

8. Future conservation planning in California will require protecting larger landscape units, taking into account the distribution and life history requirements of multiple species that require specific habitats.

9. The Department has proposed a new approach to address the conservation of California's natural heritage -- **NATURAL COMMUNITY CONSERVATION PLANNING (NCCP)** -- which has been authorized by recent legislation.

10. The Department has initiated a pilot NCCP effort for the Coastal Sage Scrub community in southern California.

11. The goal of NCCP is to conserve viable populations of California's native animals and plants, and their habitats.

12. The goal of NCCP for Coastal Sage Scrub is to identify a scientifically-justified system of Coastal Sage Scrub habitat areas to be managed for its ecological values and the long-term protection of multiple species of interest.

13. The NCCP Program shall be an innovative, community-level approach to the conservation of the Coastal Sage Scrub natural community and shall not be considered as abrogating current responsibilities of the State and Federal governments pursuant to the endangered species acts or for recovery actions or management which would otherwise be required pursuant to those acts.

THE DEPARTMENT AND THE SERVICE SHALL IMPLEMENT AS FOLLOWS:

1. The Department shall be responsible for developing the NCCP process and guidelines with Service review and concurrence.

2. The agencies will work together to assure that NCCPs are designed to facilitate compliance with the Federal Endangered Species Act Section 10(a) permit requirements and the California Endangered Species Act Section 2081 permit requirements. NCCPs so designed shall be sufficient to meet actions which otherwise may be required pursuant to the State and Federal acts.

3. There shall be public involvement in the development of the NCCP process and in the scoping and review of individual NCCP documents.

4. A Scientific Review Panel (SRP), currently consisting of Drs. Peter Brussard, Michael Gilpin, Dennis Murphy, Reed Noss and John O'Leary has been established to recommend appropriate survey methods, conservation biology techniques, and species and habitat protection needs for Coastal Sage Scrub and associated sensitive species.

5. Information and analysis undertaken by the SRP shall be presumed to constitute the best information available until, and unless, further credible analysis and investigation show the contrary.

6. All data and information relating to Coastal Sage Scrub and associated sensitive species, including data used by the SRP in the preparation of its recommended survey methods and conservation guidelines shall be shared.

7. Agencies shall jointly review the SRP's scope of work and recommended survey methods and conservation guidelines.

AUTHORITY:

1. Nothing in this MOU shall be construed as limiting or affecting in any way the authority of the parties to this MOU.

LIMITATIONS AND AMENDMENTS:

1. No alteration or variation of the terms of this MOU shall be valid unless made in writing and signed by both parties to this MOU. In addition, no oral understanding or agreement not incorporated in this MOU shall be binding on either of the parties to this MOU.

2. This MOU may be amended by either party upon consent, in writing, of both parties to this MOU.

TERMINATION:

1. This agreement shall remain in force and effect until termination by the Department or the Service. Such termination shall be effective upon 30 days' notice in writing.

This MOU has been executed by and on behalf of the parties hereto as of the date last signed below:

12-4-91

Douglas P. Wheeler
Secretary for Resources

Date

John F Turner

12/4/91

John F. Turner, Director
U. S. Fish and Wildlife Service

Date

Pete Bontadelli

12-4-91

Pete Bontadelli, Director
California Department of Fish and Game

Date

Marvin L Plenert

12-4-91

Marvin L. Plenert, Regional Director
U. S. Fish and Wildlife Service

Date

Assembly Bill No. 2172

Passed the Assembly September 13, 1991

____
Chief Clerk of the Assembly

Passed the Senate September 13, 1991

____
Secretary of the Senate

This bill was received by the Governor this ______
day of ____________, 1991, at _____ o'clock ___M.

____
Private Secretary of the Governor

CHAPTER ____

An act to add Chapter 10 (commencing with Section 2800) to Division 3 of the Fish and Game Code, relating to fish and game, and making an appropriation therefor.

LEGISLATIVE COUNSEL'S DIGEST

AB 2172, Kelley. Natural community conservation.

(1) Under existing law, it is the policy of the state to conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat and, consistent with conserving the species, to acquire lands for habitat for these species.

This bill would authorize the Department of Fish and Game to enter into an agreement with any person to prepare and implement a natural community conservation plan. The bill would authorize the department to prepare nonregulatory guidelines for the development and implementation of natural community conservation plans, and would permit community conservation planning to be undertaken by local, state, or federal agencies independently or in cooperation with other persons. The bill would require the department to be compensated for the actual costs incurred in preparing and implementing natural community conservation plans.

(2) Existing law continuously appropriates the money in the Fish and Game Preservation Fund to the department to carry out the Fish and Game Code. Because this bill would increase the revenues to the fund, the bill would make an appropriation.

Appropriation: yes.

The people of the State of California do enact as follows:

SECTION 1. The Legislature finds and declares all of the following:

(a) The continuing population growth in California will result in increasing demands for dwindling natural resources and result in the continuing decline of the state's wildlife.

(b) There is a need for broad-based planning to provide for effective protection and conservation of the state's wildlife heritage while continuing to allow appropriate development and growth.

(c) Natural community conservation planning is an effective tool in protecting California's natural diversity while reducing conflicts between protection of the state's wildlife heritage and reasonable use of natural resources for economic development.

(d) Natural community conservation planning promotes coordination and cooperation among public agencies, landowners, and other private interests, provides a mechanism by which landowners and development proponents can effectively participate in the resource conservation planning process, provides a regional planning focus which can effectively address cumulative impact concerns, minimizes wildlife habitat fragmentation, promotes multispecies management and conservation, provides one option for identifying and ensuring appropriate mitigation for impacts on fish and wildlife, and promotes the conservation of broad based natural communities and species diversity.

(e) Natural community conservation planning can provide for efficient use and protection of natural and economic resources while promoting greater sensitivity to important elements of the state's critical natural diversity.

(f) Natural community conservation planning is an effective planning process which can facilitate early coordination to protect the interest of the state, the federal government, and local public agencies, landowners, and other private parties.

(g) Natural community conservation planning is a mechanism that can provide an early planning framework for proposed development projects within the planning area in order to avoid, minimize, and compensate for project impacts to wildlife.

(h) Natural community conservation planning is consistent with and will support the fish and wildlife management activities of the Department of Fish and

Game in its role as the trustee for fish and wildlife within the state.

(i) The purpose of natural community conservation planning is to sustain and restore those species and their habitat identified by the Department of Fish and Game which are necessary to maintain the continued viability of those biological communities impacted by growth and development.

SEC. 2. Chapter 10 (commencing with Section 2800) is added to Division 3 of the Fish and Game Code, to read:

CHAPTER 10. NATURAL COMMUNITY CONSERVATION PLANNING

2800. This chapter shall be known and may be cited as the Natural Community Conservation Planning Act.

2805. The definitions in this section govern the construction of this chapter.

(a) "Natural community conservation plan" means the plan prepared pursuant to an agreement entered into in accordance with subdivision (a) of Section 2810. The plan identifies and provides for the regional or areawide protection and perpetuation of natural wildlife diversity, while allowing compatible and appropriate development and growth.

(b) "Wildlife" has the same meaning as defined in Section 711.2.

(c) "Person" has the same meaning as defined in Section 711.2.

2810. The department may enter into agreements with any person for the purpose of preparing and implementing a natural community conservation plan to provide comprehensive management and conservation of multiple wildlife species, including, but not limited to, those species listed pursuant to Article 2 (commencing with Section 2070) of Chapter 1.5. The agreement shall include cost reimbursement provisions pursuant to Section 2840.

2820. Natural community conservation planning may be undertaken by local, state, and federal agencies independently or in cooperation with other persons. The plan shall be consistent with the agreement entered into pursuant to Section 2810 and shall be approved by the department for implementation upon meeting the standards established by the department for natural community conservation.

2825. (a) The department may prepare nonregulatory guidelines for the development and implementation of natural community conservation plans. The guidelines are exempt from Chapter 3.5 (commencing with Section 11340) of Division 3 of Title 2 of the Government Code. The guidelines may include, but are not limited to, all of the following:

(1) Defining the scope of a conservation planning area.

(2) Determining conservation standards, guidelines, and objectives for the planning area.

(3) Appointing one or more advisory committees to review and make recommendations regarding the preparation and implementation of natural community conservation plans.

(4) Coordinating with local, state, and federal agencies.

(5) Incorporating public input.

(6) Ensuring compatibility with the federal Endangered Species Act (16 U.S.C. Sec. 1531 et seq.).

(7) Obtaining approval of the natural community conservation plan by the department.

(8) Provisions for implementation of the plan.

(9) Monitoring and reporting on plan implementation.

(10) Amending the plan consistent with the initial intent of the plan.

(b) Nothing in this chapter exempts projects proposed in a natural community conservation planning area from the requirements of the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code).

(c) Natural community conservation plans, as appropriate, shall be implemented pursuant to Section 2051.

(d) To the extent practicable, implementation of natural community conservation plans shall use the services of either the California Conservation Corps or local community conservation corps.

2830. Upon recommendation of the department, the commission may authorize, pursuant to Section 2084, the taking of any candidate species whose conservation, protection, restoration, and enhancement is provided for in a department approved natural community conservation plan consistent with paragraph (6) of subdivision (a) of Section 2825.

2835. The department may permit the taking, as provided in this code, of any identified species whose conservation and management is provided for in a department approved natural communities conservation plan.

2840. (a) The department shall be compensated for the actual costs incurred in participating in the preparation and implementation of natural community conservation plans. These costs may include consultation with other parties to agreements authorized by Section 2810, providing and compiling wildlife and wildlife habitat data, reviewing and approving the final plan, monitoring implementation of the plan, and other activities necessary to the preparation and implementation of a plan.

(b) The department shall be compensated for those expenses identified in subdivision (a) according to a schedule in the agreement authorized by Section 2810.

SEC. 3. This act does not apply to any agreement for the preparation of a habitat conservation plan or natural community conservation plan approved by the Director of Fish and Game at the time of enactment of this act.

SOUTHERN CALIFORNIA
COASTAL SAGE SCRUB

NATURAL COMMUNITY CONSERVATION PLANNING

Draft Recommendation for Conservation Strategy

March 26, 1993

Distributed for Review by:

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1. Introduction

This document presents in outline form the recommended near-term strategy for the Coastal Sage Scrub (CSS) Natural Community Conservation Planning (NCCP) process. It is being circulated by the California Department of Fish and Game in draft form for public comment. It is based on conservation guidelines being drafted in collaboration between the staff of the California Department of Fish and Game and the US Fish and Wildlife Service and the Scientific Review Panel (SRP).

2. Foundation

a. Premises on CSS ecology

1. CSS vegetation is dominated by several species throughout the range and has a varying species composition depending on specific physical and successional conditions. The definition of CSS has been identified by the SRP.

2. While a variety of species are characteristic of CSS, no single animal species serves as a perfect indicator of CSS conditions. Rather, many species dependant on CSS are found in only a subset of the community, and, conversely, many nominally CSS species are widely distributed in non-CSS habitats. Nonetheless, a useful suite of target species and species of concern has been identified by the SRP for planning purposes.

3. In some portions of the region, areas of CSS may convert to chaparral or grassland, depending on slope, exposure, climate, fire history, and other factors; conversely, chaparral or grassland areas may convert to CSS.

4. CSS exists intermixed with other ecological communities, particularly in the highly variable and dissected terrain of coastal Southern California.

b. Premises on conservation challenge

1. The Southern California CSS region is already severely degraded by past urbanization and agricultural land conversion.

2. The threat to CSS is more than just loss of total area. Threats also include loss of distinct CSS subtypes and the loss of the special conditions needed to maintain the broad suite of CSS species of concern.

3. Because CSS is naturally found intermixed with other communities, the best conservation strategy for CSS is to preserve large patches of native vegetation in which patches of CSS are embedded.

4. Land conversion has not only reduced the areal extent of CSS habitat, but has also ruptured connections among remnant habitats. These connections are critical to the long-term survival of CSS species.

5. In its present condition, no pattern of remnant land can constitute a self-sustaining CSS reserve system. The status quo strategy of "benign neglect" management likely will result in substantial losses of CSS species diversity in the region.

6. A smaller reserve system consisting of somewhat less than the current extent of all remnant CSS habitat under an adaptive management regime may have a reasonable chance of maintaining CSS biodiversity in the long term.

7. Within the Southern California region as a whole, roughly a dozen subregions can be identified based on geography, the ecological characteristics of CSS species, and pattern of past urban impact. Each appears to have different distinct local conditions that will affect the conservation approach to be used.

8. Each subregion will need to meet its individual conservation objectives to promote the stability of the region as a whole.

9. Despite the extent of current threat, the majority of the species of concern are not in danger of imminent extinction. Some small amount of short-term loss can be tolerated as long as there is adequate long-term enhancement. A conservative estimate of 5% enhancement potential leads to a corresponding 5% estimate of the tolerable short-term loss in any subregion. A level of enhancement beyond 5% should be encouraged.

c. Premises on timing

1. The Southern California planning region is too large to be planned as a single unit. Subregions that are based upon both biological and political considerations have been defined for conservation planning purposes. The scale and focus of the subregions has been defined by the SRP.

2. The subregional conservation planning will progress at different rates due to different local economic conditions. Some subregions are clearly ready to initiate NCCP planning now; others may not participate for five years or more.

3. Despite recent efforts, there is still a significant lack of scientific information on important aspects of CSS biology necessary to formulate a long-term plan.

4. Practical estimates of the time needed to fill data gaps range from three to six years; the time period involved depends upon the extent of projected habitat loss, which in turn determines the degree of precision needed to evaluate a plan.

5. Hence, a varying amount of time is anticipated *before* a completed subregional plan is available.

3. Conservation Planning Guidance provided in two phases

- Interim guidance to
  - minimize foreclosure of options for long-term conservation planning.
  - minimize short-term loss of habitat and CSS species.

- Long-term guidance to
  - guide preparation and approval of Subregional NCCP's.
  - provide regional framework for Subregional NCCP's.

a. Interim Strategy

- Minimize short-term loss until long-term enhancement program is formulated.
  - Limit total interim loss to 5% of CSS habitat in any subregion.
  - To the maximum degree practicable, the 5% loss should be limited to areas with lower populations of species of concern.

- Protect areas of higher long-term *reserve value* until a subregional plan can be put in place.

- Protect *landscape linkages* between areas of higher long-term reserve value until a subregional plan can be put in place.

- Steer development pressure toward areas that have low long-term conservation value.

- Ensure that all habitat loss is adequately mitigated.

b. Long-term Strategy

- Conduct scientific surveys to support planning.
  - Vegetation mapping and species surveys coordinated for each subregion.
  - Population and ecological studies of target species coordinated for region.

- Designate a system of interconnected reserves.
  - Maximize biodiversity.
  - Maximize expected persistence of species of concern in subregion.
  - Provide for no net loss of habitat value from present, taking into account management and enhancement.

- Establish a wide range of habitat management and enhancement tools.

- Design monitoring program to provide guidance for management.

4. Implementing Interim Strategy

The interim strategy can be implemented in steps. These are listed below with comments:

1. Establish subregional NCCP planning body according to process guidelines.

2. Designate subregions.
   Focus areas have been designated by the SRP. The actual boundaries between focus areas need to be drawn to designate subregions for NCCP planning. The 5% interim area loss cap will apply to each subregion. Approval of subregional boundaries for planning purposes must meet the objective of limiting short-term losses of species of concern.

3. Inventory CSS habitat and species in subregion.
   As of winter 1993, basic inventory work on vegetation mapping has been completed. Species surveys are incomplete, but comprehensive species surveys may not be critical to interim effort. Individual parcels considered for development will need to be surveyed for sensitive species.

4. Determine long-term conservation value of lands in subregion.
   See evaluation logic and methodology, below.

5. Calculate CSS habitat area and compute 5% interim loss limit for each subregion.
   All CSS habitat in the subregion is to be counted to compute the basis for the 5%, including all publicly and privately owned land. There is no current minimum parcel size threshold for consideration, although some lower limit may be appropriate in some subregions. The calculation must be verified by the US Fish and Wildlife Service and the California Department of Fish and Game.

6. Establish an entity to serve as a central clearing house to account for cumulative habitat loss in each subregion. Entity will advise local land use jurisdictions.
   The entity could be the NCCP planning body, a council of governments, or a wildlife agency. Regardless, the US Fish and Wildlife Service and the California Department of Fish and Game need to be provided ongoing habitat loss information.

7. Identify interim mitigation requirements for all development on CSS habitat.
   This would best be done by the subregional NCCP planning body; it must be established in a subregional planning agreement or another written document requiring concurrence of the US Fish and Wildlife Service and the California Department of Fish and Game. The provisions for interim mitigation measures will need to be applied by local jurisdictions. Any landowner receiving approval for interim CSS take will need to make an appropriate commitment to continue to participate in the overall subregional NCCP program.

8. Identify and fill scientific data needs for long-term planning.
   SRP conservation guidelines contain much guidance on this process.

9. Complete and implement subregional NCCP according to process guidelines.

5. Determining Potential Long-term Conservation Value

a. Evaluation Logic

To establish the areas of potential long-term conservation value and identify land linkeges, Higher Value Districts must be identified. These large patches of CSS and non-CSS natural lands are possible foci of a reserve system. Recommended policies for the Higher, Intermediate and Lower value lands is given in section 6.

1. Natural Land: Does land contain all or part of a patch of natural land?
   Y: Check CSS presence (#2)
   N: Not relevant for reserve planning.

2. CSS: Is CSS present?
   Y: Check large size (#3)
   N: Check landscape linkages (#5)

3. Large Size: Is CSS part of a large effective patch size.
   Y: Land forms a Higher Value District
   N: Check proximity (#4)

4. Proximity: Is patch close to Higher Value District?
   Y: Land is Intermediate Value
   N: Check landscape linkages (#5)

5. Landscape Linkages: Is patch located in corridor between Higher Value Districts?
   Y: Land is Intermediate Value
   N: Check species presence (#6)

6. Species Presence: Does patch support high density of target species?
   OR
   Does patch support highly endemic species or rare sub-habitat types?
   Y: Land is Intermediate Value
   N: Land is Lower Value

b. Evaluation Methods

1. Natural Land: Includes all native California natural communities; includes forestlands, brushlands, native and non-native grasslands, non-irrigated grazed land, and vacant or disturbed natural land. Excludes lands subject to intensive agriculture and urban uses.

2. CSS: CSS is primary or secondary cover of characteristic CSS plant species dominants as defined by SRP.

3. Large Size: Effective patch size represents effective presence of CSS habitat at an intermediate scale and is meant to integrate over minor fragmentation and differences in vegetation mapping methodologies. The method of calculating effective patch size

will be adjusted to conditions present in each subregion. Generally, an effective patch size for CSS is determined by assays of relatively continuous natural habitat and relatively dense clusters of CSS on the scale of a 1 or 2 mile diameter circle.

The concept of effective patch size reflects the naturally patchy distribution of CSS and the different scales of CSS mapping. It will be important to avoid artificially discarding a habitat patch as "too small" merely because the habitat is intermixed with other natural vegetation types. It is appropriate to exclude landscape areas that are highly urbanized. The SRP is considering methods for determining effective patch size. The methods would be adapted to local conditions. Overall, it is expected that roughly 10% to 25% of the CSS in a subregion would fall outside of the higher potential long-term conservation value districts.

4. Proximity: Measured as a direct, straight-line distance. The appropriate scale would be determined for each subregion and is on the order of one-half to one mile.

5. Landscape Linkages: Any natural habitat patches may play a role in connectivity between larger natural areas. Draw corridors such that each Higher Value District is connected to the two or three other districts that are closest. A geometric corridor between Higher Value Districts is defined by drawing the two straight lines which are tangent to each district. Any straight line from any point in one district to any point in the other district will fall within this corridor. The boundary can be adjusted as needed to reflect features such as riparian areas which may curve outside of the strictly defined geometric corridor.

6. Species Presence: This test identifies areas that need special protection in the interim to reduce take of species, and/or that may have long-term value due to special conditions that support significant populations of target species or highly endemic species or rare sub-habitat types. What constitutes significant populations must be determined for the species of concern for each subregion. The SRP is considering significance levels along the lines of 5 pair of gnatcatcher or cactus wren, or more than 20% of the known population in the subregion for plants or animals. Thus, small, isolated CSS patches with relatively small populations would be considered of low long-term potential value. Development of these lands could result in a take of small numbers of individuals of the species of concern without affecting long-term population viability.

The species presence test specifically means that each parcel under consideration for development will have to go through a species clearance: one-time (correct season and methodology) survey for reasonably expected rare occurrences (plants, primarily), for high abundance of target species or other special conditions.

6. Recommended Policy

a. Pending completion of subregional NCCP

While formal planning is underway, the conservative interim strategy seeks to minimize short-term loss of habitat and CSS species and to prevent foreclosure of options for long-term conservation planning by deferring development decisions on lands that may be important components of a final CSS community conservation plan.

Potential Long-term Conservation Value	Recommended Policy
Higher Value	Defer development decisions Determine actual conservation suitability in NCCP
Intermediate Value	Case-by-case decisions Special mitigation may be warranted
Lower Value	Allow development Adequate mitigation

Cumulative loss in subregion limited to 5% of CSS total

b. With subregional NCCP

The subregional NCCP plan will supercede the interim designation of potential long-term conservation value. Inherent in the NCCP is resolution of technical and implementation issues to allow explicit specification of perpetual conservation program. The final subregional NCCP may provide for development of lands initially designated as *potential* long-term conservation value because it will have determined *actual* long-term conservation value. Conversely, lands originally thought to be of lower value may be determined to be valuable in the final conservation plan.

The final subregional NCCP may provide for loss of CSS habitat area beyond the interim 5% limit if it can demonstrate the ability to provide greater than 5% net long-term enhancement of remaining habitat value. Similarly, the final plan may provide for more than 5% area loss if scientific studies have demonstrated that a lower goal than no net loss of habitat value is adequate to meet the CSS preservation goals of the overall NCCP program.

In sum, the opportunity to prepare an explicit subregional plan will allow economic interests to be served beyond the relatively conservative interim strategy outlined above. At present, however, the best available scientific information supports only the conservative strategy, and moving beyond the conservative strategy will require substantial additional scientific information, particularly on the population biology of target species and on habitat enhancement techniques.

c. If a subregional NCCP is not completed

Total cumulative loss of CSS habitat area is limited to 5%. Public agencies will need to undertake restoration independently of private lands to attempt to compensate for the 5% habitat area loss.

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STATEMENT OF JOHN C. SAWHILL
PRESIDENT AND CHIEF EXECUTIVE OFFICER
OF THE NATURE CONSERVANCY
BEFORE THE HOUSE MERCHANT MARINE AND FISHERIES COMMITTEE
APRIL 1, 1993

Mr. Chairman and members of the Committee, my name is John Sawhill, and I am president of The Nature Conservancy.

I appreciate the opportunity to participate in your deliberations concerning the Endangered Species Act and the conservation of this nation's precious natural heritage.

The Nature Conservancy is an international non-profit organization dedicated to preserving the plants, animals and natural communities that represent the diversity of life on earth. Over the past 43 years, we have made significant strides toward achieving that mission. We have protected almost 7 million acres of biologically significant land in the United States, we manage a system of 1600 nature preserves, and we enjoy the support of more than 700,000 members and 800 corporate associates.

For four decades, we have been bringing together creative minds in science, business, law, and government to develop and implement practical solutions to the biodiversity crisis. In part, this has meant identifying and acquiring individual tracts of land that support rare and endangered species. But the accelerating rate of species extinction has led us in recent years to broaden our scope. In short, we are evolving from being in the intervention business to the prevention business.

This shift grew from the realization that isolated nature preserves often cannot sustain endangered species over the long term. As a result, we are now working in partnership with government, business, and local communities in an effort to protect entire ecological systems. We call our effort "The Last Great Places," and I recently announced our 300 million dollar private fundraising campaign to commence action at 40 critical ecosystems in this country, the Caribbean, Latin America, and the Pacific. I have appended an overview of the Last Great Places ecosystem partnerships, which discusses some of the work now underway. Because people live in these ecosystems, we are developing strategies that blend human needs and economic growth with habitat protection. This approach, we believe, offers the best hope of preventing species from becoming so imperiled that they need the protection afforded by the Endangered Species Act.

Mr. Chairman, I have been asked to address two issues today: the status of endangered and imperiled species on federal lands; and how the federal government can better protect these species, and protect the nation's biodiversity in general.

I am pleased to submit to the Committee a report entitled "Perspectives on Species Imperilment: A Report from the Natural Heritage Data Center Network" which addresses the first issue in detail. This report, generated by the state Heritage Data Centers, sets forth information about the distribution of listed species on federal lands. All 50 state Heritage Data Centers (plus the Navajo

Nation Data Center) contributed to this compilation and analysis. It is intended to assist this Committee by showing the relationships between federal management responsibilities and species occurrence.

As for the second issue, relating to management for species and biodiversity protection, I would like to spend a few minutes reviewing the key lessons that The Nature Conservancy has learned over the past 40 years and most particularly in recent years as we have focused on protecting ecosystems. Specifically, I will focus on the three pillars upon which I believe the solution to this country's endangered species crisis must rest: good information; coordinated management; and creative partnerships.

INFORMATION MANAGEMENT

First, and most important, sound scientific information must drive all decision-making. Recognizing this, Secretary Babbitt has wisely called for the creation of a permanent National Biological Survey. In support of that effort, we can offer the experience gained in designing and providing technical support to the alliance of 50 state Natural Heritage Data Centers.

These state government programs represent 20 years of state, federal, and private investment in compatible methodology, which allows for regional and national synthesis of data concerning species and natural communities. That approach is essential to support the setting of national priorities and innovative ecosystem planning, such as the Fish and Wildlife Service's Gap Analysis Program.

Based on our experience, we believe an effective biological information system must have the following capabilities. First, it must help guide short-term decision-making, despite inevitably incomplete and imperfect data. Second, it must compile, organize and make available basic scientific data, beginning with the distribution, abundance, health, status and trends of species and communities. This core information allows a wide variety of users to perform their own analyses, and draw their own conclusions. Third, the biological information system must be built upon proven, existing systems, lest we spend the next decade debating systems rather than saving biodiversity. We do not have time to reinvent the wheel, and I believe that the existing Heritage Network can serve as a foundation upon which to build our National Biological Survey.

To illustrate the importance of timely, complete information to ecosystem management, I would like to direct your attention to Figure 13 of our report. As shown in this graph, the Forest Service has taken a leadership role in identifying opportunities to get in front of the extinction curve. Working with state Heritage Data Centers, the Forest Service has located, documented, and is working to conserve the rarest elements of biological diversity in the National Forests including not only threatened, endangered and candidate species, but also sensitive species.

By developing "sensitive species" designations, the Forest Service is looking ahead and working to provide conservation management for species before they become so imperiled that Endangered Species Act enforcement is mandated. In this case, using the species information, the Forest Service is now undertaking conservation management for many of the 233 federally listed taxa, as well as affording special consideration for the more than 2260 taxa designated as sensitive species.

A second example of how sound information is vital to proactive planning involves a Fish and Wildlife Service initiative to develop a national level community classification. The state Natural Heritage Data Centers are working with the Service to characterize and describe G1 (critically imperiled) and G2 (imperiled) natural communities. For the first time, the Service and the state Natural Heritage Network will have a common language to facilitate prioritization, planning and protection decisions. The significance of having a uniform national-level community classification system cannot not be overemphasized; it is a necessary prerequisite for science-based ecosystem planning on a national scale.

Complementary work has also begun in a pilot phase of a "synoptic national assessment of comparative risks to biological diversity and landscape types." Coordinated and funded principally by the Environmental Protection Agency Office of Research and Development, this research effort includes The Nature Conservancy and the state Natural Heritage Data Centers, the Fish and Wildlife Service Gap Analysis Program, the U.S. Geological Survey, and others. Under this pilot program, the Heritage Data Centers are developing a database that describes the distribution by hexagonal grid cells of selected species (including all vertebrates, trees, rare plants and invertebrates) across the United States. This database will be developed in each state using Geographical Information System technology. In addition to allowing the EPA to assess the distribution of species to prioritize its biodiversity and habitat research efforts, this database will serve as the species-distribution layer for the Fish and Wildlife Service Gap Analysis Program in many states.

COORDINATED MANAGEMENT

The second pillar of success in dealing with the extinction crisis is coordinated management. Coordinated management involves integrating ecosystem protection goals across agencies, disciplines and programs. Protecting and restoring this nation's biological assets must become part of the way we foster economic development, protect human health, invest in infrastructure, and support the production of food.

I would like to briefly discuss two examples where the principle of coordinated management is being implemented by the federal government (and others) and where we believe progress is being made toward ecosystem protection.

- Within EPA, the Great Lakes Program is reaching across disciplines to link the needs of this critical freshwater ecosystem to enforcement goals, system monitoring, habitat protection, and other regulatory or clean-up actions. EPA is using data from the Great Lakes states' Heritage Data Centers, which presents a regionalized synthesis of critical habitats and indicator species, to set goals and priorities for biodiversity protection. Over time, EPA's new ecosystem focus will save money, time, and jobs -- as well as biodiversity.

- In California, The Nature Conservancy has joined with numerous local, state and federal agencies in the "Interagency Natural Areas Coordinating Committee." As a result, ecosystem protection plans and actions are becoming greater than the sum of their parts. Bureau of Land Management, California Fish and Game, the Forest Service, the State Lands Commission, California Parks and Recreation, the Fish and Wildlife Service, the Park Service, and other agencies are working with local jurisdictions to avoid duplication and create accountability for specific results.

In short, we see coordinated biological asset management replacing crisis management. That is good news.

PARTNERSHIPS

Finally, we must invest in creative partnerships. Although jurisdiction and responsibility under the Endangered Species Act are federal, effective solutions are local. Each ecosystem harbors a distinctive blend of species and faces a distinctive variety of threats. Problem-solving, therefore, must be flexible, innovative, and long-term.

An excellent example of innovative problem-solving and creative partnerships in action is Secretary Babbitt's support for the Natural Community Conservation Planning efforts in Southern California. When the Department of Interior recently listed the California gnatcatcher, it took serious enforcement action. But at the same time, it encouraged a habitat planning process -- which the Conservancy helped design -- that shifts significant responsibility for habitat protection to local government, landowners, and affected communities. The plan will allow economic growth while achieving protection of habitat not only for the gnatcatcher, but also for the many other species dependent on the coastal scrub ecosystem. This process could serve as a model for planning in those areas where species have specific fidelity to a natural community type.

Another promising experiment, in Brevard County, Florida, has the county taking responsibility for habitat planning for the endangered scrub jay. Coordinating a protection plan with fifteen municipal governments and 10,000 property owners, the county is integrating economic growth, predictability for landowners, and comprehensive habitat protection.

While each of these situations presents different challenges, making generalization difficult, The Nature Conservancy has found that three elements are necessary in forming and maintaining successful partnerships for ecosystem protection.

First, acquisition and restoration of critical core habitat areas remains the most intelligent and cheapest first step in avoiding confrontation and irretrievable loss of biodiversity.

Second, we have found that we can enhance the viability of the core sites by working with nearby private landowners to facilitate ecosystem management. For example, in Wisconsin's Baraboo Hills, The Nature Conservancy and Wisconsin's Department of Natural Resources are using U.S. Forest Service funds from the Forest Stewardship and Stewardship Incentive programs to develop a biological inventory of private, forested lands near sensitive protected areas. These projects include vegetation mapping, hiring a forest ecologist to train private foresters to use Heritage Program data, and supporting landowner contact programs to inform private forest owners about ecologically significant sites on their land and biologically sound management options. Beyond offering information, our greatest challenge is to design economically effective incentives for private landowners to manage their lands for biodiversity.

This country must invest in the creativity and commitment of our ranchers, farmers, and other private landowners, because long-term solutions depend upon respect for private property rights. We must design "Ecological Enterprise Zones" that encourage sustained private investment in biological management of the land. In that context, we can and should develop model accounting, tax and investment strategies that correlate biological health with stable economic growth.

Finally, we must accept the challenge of financing ecosystem protection without depending upon significant increases in federal appropriations. That job will be easier, of course, if we redirect the money we are already spending which negatively alters the landscape. We can no longer afford to subsidize habitat destruction. Rather, we can invest in partnerships with those whose livelihoods have depended upon non-sustainable resource exploitation to help find sustainable alternatives. In addition, the private conservation sector must accept responsibility for delivering matching value to initiate new programs and test new approaches In announcing our Last Great Places fundraising campaign, The Nature Conservancy has demonstrated not only its commitment to ecosystem protection, but its pledge to deliver this matching value to our partners.

I am optimistic. The Endangered Species Act has been an appropriate governmental response to the biodiversity crisis and it must be reauthorized. The Endangered Species Act not only compels us to examine and protect the health and status of this nation's biodiversity but it also promotes the protection of our natural heritage through good information, coordinated management, and creative partnerships. I see solid, cost-effective progress in each of these areas, and I would ask Congress to support initiatives that further these goals.

Again, I appreciate the opportunity to share The Nature Conservancy's views, and I would be pleased to answer any questions you may have.

The
Nature
Conservancy.

International Headquarters
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TEL 703 841-5300
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THE NATURE CONSERVANCY'S LAST GREAT PLACES

Projects as of March 1993

DOMESTIC PROJECTS

ACE Basin, SC
The Adirondacks, NY
Big Darby, OH
Block Island, RI
Cache River Wetlands, IL
Cape Cod and Martha's Vineyard/Nantucket, MA
Chesapeake Rivers, MD
The Chicago Area Conservation Initiative, IL
Clinch Valley Bioreserve, VA
Colorado Plateau, UT
Florida Keys, FL
French Creek Watershed, NY/PA
Gray Ranch, NM
The Hawaiian Forest Challenge, HI
Horse Lick Creek, KY
Lower Roanoke River, NC
Nipomo Dunes, CA
The Peconic Bioreserve, NY
Pocono Mountains, PA
San Pedro River, AZ
Santa Margarita River, CA
The Shawangunk Ridge, NY
Southern Berkshires, MA
Tallgrass Prairie Preserve, OK
Texas Hill Country, TX
Tidelands of the Connecticut, CT
Upper Colorado River Basin, CO
Virginia Coast Reserve, VA

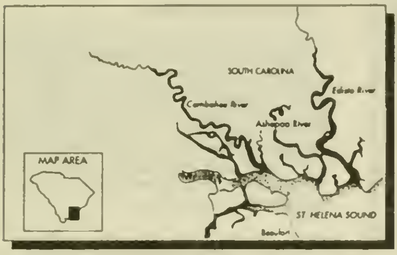
INTERNATIONAL PROJECTS

Blue Mountains/John Crow Mountains National Park, Jamaica
The Condor Bioreserve, Ecuador
Darién Biosphere Reserve, Panama
Guaraqueçaba Environmental Protection Area, Brazil
Jaragua National Park, Dominican Republic
Mbaracayú Forest Reserve, Paraguay
Pacaya-Samiria National Reserve, Peru
The Palau Islands Bioreserve
Ría Lagartos/ Ría Celestún, Mexico
Rio Bravo Conservation and Management Area, Belize
The Sulawesi Bioreserve, Indonesia
Talamanca Caribbean Corridor, Costa Rica

Contact: Communications Department (703) 841-4897

ACE Basin, SC

A Dynamic Estuarine Wonder



Location: Outer Coastal Plain; Southeastern South Carolina
Size of Protection Area: 350,000 Acres
Total Rare or Endangered Species: 27

Ecological Significance

The watershed of the Ashepoo-Combahee-Edisto (ACE) rivers encompasses one of the largest complexes of undeveloped wetlands/uplands ecosystems remaining on the Atlantic Coast. Biologically rich habitats support numerous species of birds, amphibians, reptiles, and fish. Additionally, the remarkable interlocking web of ecosystems, including forested uplands, forested wetlands, extensive tidal marshes, barrier islands, and peatlands support more than 90 natural communities, many harboring rare or endangered plant and animal species.

Threats

Based on projections from the South Carolina State Data Center, population growth in South Carolina coastal counties will increase by approximately 64 percent during the next three decades. The counties adjacent to the ACE watershed will experience some of the most dramatic change. Growth associated with increased residential, resort, and commercial development imposes significant ecosystem stresses through nonpoint-source pollution, habitat destruction and fragmentation, and general human disturbances. However, working with industrial and private landowners, the Conservancy is developing partnerships that address and avoid threats to both upland and wetland natural communities and their associated ecological functions.

Conservation Plan

In cooperation with a variety of federal, state, and private-sector conservation partners, the Conservancy is implementing both traditional and creative protection strategies to maintain the ecological integrity of the ACE Basin. The Conservancy is working with state and federal agencies to acquire certain strategic tracts which will function as sites for public resource management, recreational use, natural area interpretation and research. Overall, the Conservancy seeks to encourage compatible traditional uses, both economic and/or recreational, through enlisting appropriate participation of local citizens, private landowners, conservation organizations and government agencies. Such uses include proper timber and wildlife management practices, commercial and recreational fishing, and eco-tourism.

Conservation Update

Fuji Photo Film U.S.A., Inc. and Westcliffe Publishing Company of Englewood, Colorado have co-sponsored the publication of South Carolina's Wetland Wilderness: The ACE Basin, by Thomas P. Blagden, Jr. This magnificent color photography book is designed to increase appreciation for the ACE Basin, and to help raise funds to protect its rare plants and animals. To date, $30,000 has been raised from the sale of the book.

Campaign Progress

Through the support of charitable trusts, private corporations and conservation grant awards, the Conservancy has raised a total of $1.2 million for land acquisition, preserve design and stewardship activities. Additionally, we have committed $12.5 million in reimbursable cooperative funding agreements with our conservation partners in order to acquire some 15,800 acres. Through conservation easements, the Conservancy has protected another 6,600 acres (valued at $4.5 million). Further, 5,300 acres valued at $2 million have been donated to the Conservancy by private landowners and subsequently transferred to the state of South Carolina for management. Although the Conservancy has made tremendous progress toward implementing comprehensive ecosystem protection in the ACE, there remains an urgent need to preserve additional habitats vital to southern bald eagles, wood storks, loggerhead sea turtles, and a host of other rare and endangered plant and animal species. Therefore, it is critical that we raise $3 million over the next three to five years to ensure adequate protection for the ACE Basin.

Goal: $3 Million
Raised: $1.2 Million

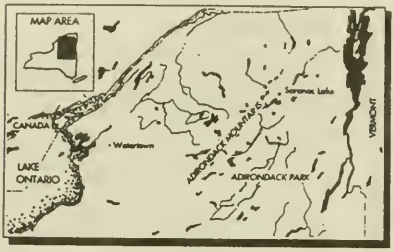
Major Donors:
- Mary Flagler Cary Charitable Trust
- Anonymous Foundation
- Merck Family Fund
- National Fish and Wildlife Foundation
- Fuji Photo Film, USA
- Dow Chemical

Contact: South Carolina Field Office, (803) 254-9049

The Adirondacks, NY

The Nature Conservancy.

What the World Once Looked Like



Location: Upstate New York
Size of Protection Area: Six Million Acres
Total Rare or Endangered Species: 216

Ecological Significance

With a 100-year history of large-scale land protection, the Adirondacks serve as a model of natural resource conservation and compatible economic land use. The six-million-acre Adirondack Park contains 2,759 lakes and ponds, 900 miles of rivers, and 24,000 miles of brooks and streams. Expansive, undeveloped landscapes comfortably harbor a wide range of plant and animal species and ecosystems, including the largest old growth forest in the east; Lake George, one of the world's purest examples of an oligotrophic dimictic (deep, steep, and clear) lake; and boreal ecosystems, dominated by plants and animals not normally found south of Canada. Six bat species, including the federally endangered Indiana bat and the extremely rare Small-footed bat, use abandoned Adirondacks mines as hibernacula, one of which is the largest site in the Northeast. Along its Adirondack stretches, the Hudson River supports an extremely rare habitat known as riverside ice meadows, home to nine species of rare plants, including the Auricled twayblade.

Threats

A "public/private" park, the Adirondack landscape remained largely intact during the Park's first century. But times have changed. Public land protection is now falling short of need. Many ecologically significant lands outside of state ownership are threatened with subdivision and development as family successions and financial circumstances force landowners to sell their properties. Budget constraints, however, severely limit New York State's ability to acquire new conservation lands, or even to take proper care of the land the public now owns.

Conservation Plan

The Adirondack Chapter of The Nature Conservancy and its partner organization, the Adirondack Land Trust, seek ways to maintain a compatible economy that thrives on and protects the region's vast natural resources. These activities include recreation, sustainable timber harvesting, and agricultural production. Working directly with individual and corporate landowners, local communities, and New York State itself, the Conservancy has targeted a wide range of ecosystems within the Adirondacks for acquisition, protection, and management.

Conservation Update

The Conservancy and Land Trust work quietly on an individual basis with landowners to encourage enlightened land use, from farming and forest management to estate planning and conservation easements on lakeshore properties. For example, the Conservancy is working with Whitney Industries, owners of 54,000 acres of pristine woodlands and lakes, to plan for the long-term management of the property. In a joint protection project with International Paper Company, the Conservancy has purchased a conservation easement on the Hague Mountain Bat Hibernaculum.

Campaign Progress

With the support of individuals and foundations, the Conservancy has raised a total of $1.25 million in gifts and pledges toward a $3.3 million goal for the Lake George Shoreline Protection Project. These funds will help purchase the longest ribbon of forested shoreline remaining on the lake. In addition, donors have contributed more than $250,000 this year to acquire land at two other major preserves, the Clintonville Pine Barrens and the Hague Mountain Bat Hibernaculum. Major donors to these critical areas include Dr. and Mrs. James Budny and the Seagears Family. The Wild Adirondacks Fund for Land Acquisition has been established for donors wishing to ensure the future of this magnificent region through land protection.

Goal: $3.3 Million
Raised: $1.25 Million

Major Donors:

Mr. and Mrs. Henry Rowan

Mr. Egon Ottinger

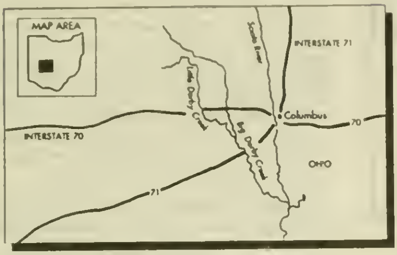
Mrs. Helen V. Froehlich

Contact: New York/Adirondack Field Office, (518) 576-2082

Big Darby Creek, OH

The Nature Conservancy.

The Midwest's Aquatic Treasure



Location: Near Columbus in Central Ohio
Size of Protection Area: 580-Square-Mile Watershed
Total Rare or Endangered Species: 24

Ecological Significance

The Big Darby Creek system is the healthiest and most diverse aquatic system of its size in the Midwest and is among the top five warm freshwater habitats in the nation. The creek winds through a 580-square-mile watershed that includes remnant prairies and savannas once part of a tallgrass prairie ecosystem. It harbors 86 species of fish, including the federally endangered Scioto madtom, and 40 species of mollusks, including the federally endangered Northern riffle shell and the Northern club shell. One of the last free-flowing streams in Ohio, 82 miles of the Big Darby system have been designated as a state scenic river. The same areas have been nominated for National Scenic River status.

Threats

Although the rural character of the Darby plains has helped maintain Big Darby Creek's exceptional water quality, changes in the landscape have begun to threaten the creek's diverse aquatic life. The three major threats facing the Big Darby are changes in water quality due to the influx of sediment eroding off the area's farm fields, suburban growth, and the deforestation of stream corridors. The increased sediment load makes it difficult for some fish species to locate food as well as disrupting their spawning cycle. It also blankets the streambed, suffocating many filter feeders such as the mussels and eliminating the habitat needed by some fish species. The rapid growth of Columbus is subjecting the stream to increasing erosion levels from construction sites, sewage treatment plant effluent, storm water runoff, and the effects of a general increase of the impermeable area within the watershed.

Conservation Plan

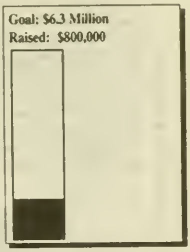
To protect Big Darby, The Nature Conservancy is working with thirty public and private partners on a variety of conservation techniques, such as voluntary landowner agreements, conservation easements, and land acquisition. In addition, the Conservancy is pursuing soil conservation and reforestation programs and community outreach activities. This strategy should allow economic progress to continue in the Big Darby watershed without damaging the area's unusual natural resources. With the help of a unique computer-based information system that incorporates data on natural resources, economics, demographics, and land use, The Nature Conservancy is able to identify the areas of the watershed that are the most critical to the health of the creek and help to focus the partnership's efforts where they can do the most good.

Conservation Update

To coordinate the Big Darby Project, the Conservancy hired a full-time project director and entered into a reimbursable agreement with the U.S. Department of Agriculture Soil Conservation Service for the services of an Agricultural Coordinator. Together with the Ohio Chapter staff, these individuals have been able to forge an unprecedented partnership between landowners, the business community, all levels of government, and private organizations. Through this partnership, a variety of collaborative projects have been launched to protect key sites, conduct research, educate the public about the creek, and develop innovative land-management techniques.

Campaign Progress

Through the support of private corporations, the philanthropic community and our members, the Conservancy has raised a total of $800,000 for land acquisition and protection activities. The Conservancy hopes to raise an additional $5.5 million over the next five years.

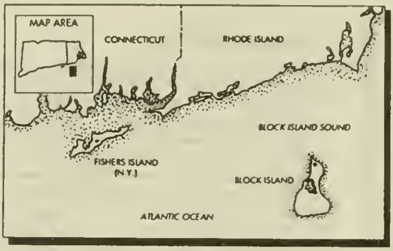


Contact: Ohio Field Office, (614) 486-4194

Block Island, RI

The Nature Conservancy.

Southern New England's Island Refuge



Location: Twelve Miles off the Southern Coast of Rhode Island
Size of Protected Area: Ten Square Miles
Total Rare or Endangered Species: 40

Ecological Significance

Formed by glaciers 12,000 years ago, Block Island is made up of an array of habitats: morainal grasslands, coastal bluffs, salt and brackish ponds and marshes, sand dunes, and various freshwater wetland ecosystems. These habitats support a rich diversity of wildlife including many rare and endangered plants and animals. Several of these species were once common throughout New England, but now find their populations reduced to this haven off the coast. The Island is home to one of the few viable populations of the globally endangered American burying beetle. Thousands of migratory shorebirds, waterfowl, raptors, and songbirds also depend on the island as a stopover in their journeys north and south along the Atlantic Flyway.

Threats

Continued residential development poses a significant threat to several community types on Block Island. Many of the island's rare plants, birds, and insects depend on the open morainal grasslands for habitat. Further fragmentation of these areas could result in additional loss. The migratory birds that depend on Block Island as a resting spot in their journeys would suffer from any further destruction of the island's wetland habitats. Declining water quality from increased levels of pollutants will also affect these species. The pressures of both residential and commercial development are among the greatest threats to Block Island's natural resources.

Conservation Plan

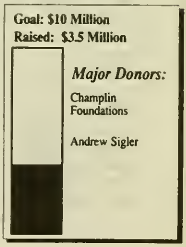
The Conservancy's work on Block Island builds upon a strong tradition of support for conservation by the residents of the island. The Conservancy is working to protect the island's most significant sites, where there are concentrations of endangered species. One strategy is to prevent excessive habitat fragmentation by working with the town on alternative zoning techniques and performance standards for development. Informing residents and visitors is also an important goal of the conservation plan, including lecture programs, special events, and increased efforts to disseminate information on the ecological significance of the area. Stewardship activities will include intensive management techniques such as mowing of open grasslands to ensure the integrity of that habitat for plants and animals. In all cases, the Conservancy will work very closely with its conservation partners on Block Island, with the state, the town, and the U.S. Fish and Wildlife Service to coordinate protection strategies.

Conservation Update

The Nature Conservancy has been working with the Block Island Conservancy, the Block Island Land Trust, the town of New Shoreham, and other organizations. For two summers in a row, the Conservancy and its partners have offered an array of programs for residents and visitors, from daily guided trail walks to an educational lecture series. We are monitoring endangered species, including the American burying beetle and the elusive Regal fritillary, a butterfly species once found on the island but perhaps now lost. Conservancy staff also write articles for the Block Island Times. These articles help further the efforts of all those who share the island's conservation ethic.

Campaign Progress

Through the support of foundations, local businesses, and a large number of individual members, more than $3.5 million has been raised toward a $10 million goal. The funds raised have allowed us to protect several tracts of land, including upland and freshwater wetland habitat. Another example of the strong conservation ethic on the island was the recent bequest of a house and eleven acres of open land by a teacher who loved the island, the late Catherine Cullinan.


Goal: $10 Million
Raised: $3.5 Million

Major Donors:

Champlin Foundations

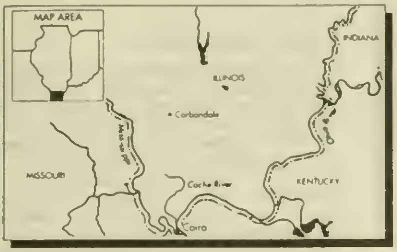
Andrew Sigler

Contact: Rhode Island Field Office, (401) 331-7110

Cache River Wetlands, IL

The Nature Conservancy.

Protecting the Waters of the Heartland



Location: the southern tip of Illinois
Size of Protection Area: 472,800 Acres
Total Rare or Endangered Species: 100

Ecological Significance

Amid the quiet waters and rocky bluffs of the Cache River watershed exist a remarkable diversity of species and landscapes. Bobcats, river otters, and bald eagles find refuge there. Attracted by nesting cavities in ancient trees and a rich supply of acorns, wood ducks breed there in great numbers. The Cache has been identified by the North American Waterfowl Management Plan as critical habitat for waterfowl and migratory shorebirds. Recent studies have proven the area to be critical nesting habitat for neotropical migratory songbirds. Located at the confluence of four major physiographic provinces — a condition that occurs in only five other areas in the United States — the Cache is both biologically and geographically significant. The area is also renowned for its scenic beauty and contains three National Natural Landmarks.

Threats

Successive waves of timbering, drainage projects, and clearing land for agriculture have exacted a terrible toll on the ecosystems of the Cache. Fragmentation of wildlife habitat, alterations to the natural hydrology, erosion, siltation, and water pollution continue to threaten the region. Soils in the watershed are highly erodible, and erosion rates range up to 150 tons per acre each year. This erosion reduces water quality, diminishes agricultural productivity, and in some wetland areas, causes silt accumulation of as much as one foot per year. Fertilizers, pesticides, and untreated sewage also pollute the wetlands, which are one of Illinois' major groundwater recharge areas.

Conservation Plan

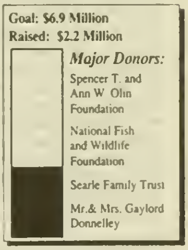
The Nature Conservancy's goal at the Cache is to protect and restore 60,000 acres of habitat while encouraging environmentally sound economic growth in the region. To address this challenge, the Conservancy has formed a public/private partnership involving Ducks Unlimited, U.S. Fish and Wildlife Service, and the Illinois Department of Conservation. With 30,000 acres already acquired, one-half of the land targeted by the plan has been protected to date. Cypress Creek National Wildlife Refuge, Lower Cache River State Natural Area, and other public preserves complement the Conservancy's 1,200-acre holding. The Conservancy is also leading the joint effort to reforest up to 15,000 acres of cleared lands by creating 'templates' for restoring complex plant communities through innovative direct-seeding methods. New technologies for controlling erosion and restoring hydrology are also being explored.

Conservation Update

In 1992, the Conservancy planted 1,260 acres of forest at the Cache, thanks to local Boy Scouts who collected five tons of native hardwood nuts and acorns. It also launched a study to provide state-of-the-art information on restoring habitat for neotropical migrant birds. A cooperative project with Southern Illinois University is studying models for environmentally sound economic development in the Cache region. The study is developing scenarios that may help illustrate how development and conservation can be compatible. The Conservancy is developing a basin-wide resource management plan with local leaders, conservation partners, and public agencies to improve conservation practices on public and private land throughout the watershed.

Campaign Progress

The Conservancy has raised $2.2 million toward its goal of $6.9 million, including $1 million from the Spencer T. and Ann W. Olin Foundation and gifts from the National Fish and Wildlife Foundation, Searle Family Trust, Mr. & Mrs. Gaylord Donnelley, Mr. & Mrs. Henry Paulson, and the Buchanan Foundation. The Conservancy testified on behalf of federal appropriations for the Cypress Creek Wildlife Refuge. Some $4.5 million were approved for 1993, double any previous appropriation.

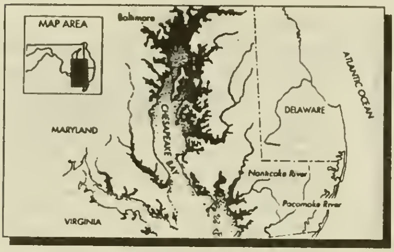


Contact: Illinois Field Office, (312) 346-8166

Chesapeake Rivers, MD

Preserving Maryland's Natural Heritage

The Nature Conservancy



Location: Eastern and Central Maryland
Size of Protection Area: Four Separate Chesapeake Bay Watersheds

Ecological Significance

The rivers of the Chesapeake provide a unique opportunity to protect the biodiversity of aquatic and terrestrial life within the watershed, as well as safeguarding the economic vitality and environmental treasures of the Chesapeake Bay. The health of the bay virtually depends on the vitality of its tributaries, and though some of the most polluted tributaries have been the focus of attention, there now exists the opportunity to assure the lasting health of these relatively undisturbed watersheds. The rivers support a wide diversity of major indicator species, including bald eagles, great blue herons, and century-old bald cypress stands. Large populations of striped bass and other species of fishes inhabit the rivers and their tributaries. The water quality of these streams allows globally rare species to thrive, including the world's healthiest population of harperella and the green floater, an endangered freshwater mussel.

Threats

Watershed areas have always been particularly vulnerable to dedgradation from activities that occur nearby. In Maryland and Delaware, the threats to the biodiversity begin in the lowland rolling hills of the watershed. Improper land management, long unrecognized for its effect on the natural communities downstream, jeopardizes water quality and the species dependent on clean water. Development, road construction, and highway runoff also cause problems for the region's water quality, as siltation and pollution choke the water's oxygen supply and cloud the streams. Logging and forest clearing cause increased soil erosion and destroy crucial habitat for the regional heron rookeries. Finally, as the rivers empty into the Chesapeake, marshes and tidal wetlands are disappearing due to a combination of wetland drainage and development, rising sea levels, and land subsidence resulting from groundwater pumping and excessive levels of sediments.

Contact: Maryland Field Office, (301) 656-8673

Conservation Update

The Conservancy's Chesapeake Rivers program will focus on four key tributaries of the Chesapeake Bay: the Nanticoke River, Nassawango Creek, Nanjemoy Creek, and Sideling Hill Creek. At Nassawango Creek, the largest tributary of the Pocomoke River, protection activities will center around the Conservancy's existing 3,300-acre preserve and include initiatives to encourage sensitive land-use practices. At Nanjemoy Creek, meanwhile, a Conservancy preserve protects one of the largest great blue heron rookeries on the East Coast as well as the endangered dwarf wedge mussel. And thanks to a generous grant from the Abell Foundation, planning efforts have started for the Sideling Hill Creek and Nanticoke River projects. In the past year alone, the Conservancy has acquired three properties totalling more than 700 acres in the Nanticoke watershed. Further acquisitions and partnerships with other conservation organizations in both Maryland and Pennsylvania will help ensure the long-term protection of these valuable habitats.

Conservation Plan

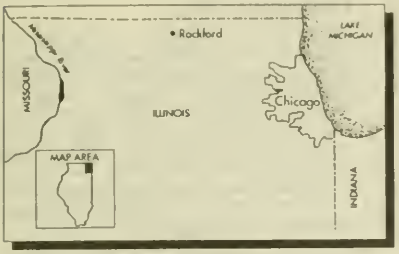
The Maryland and Delaware chapters of The Nature Conservancy will join forces with other conservation partners including the Chesapeake Bay Foundation and a range of public and private groups to protect and restore the resources of the region. The Conservancy will combine its traditional strengths in land protection with new initiatives to encourage farmers, corporate land owners, and developers to pursue their livelihoods in ways both economically viable and compatible with the long-term health of the watershed.

The Nature Conservancy has not yet established its fundraising goals for this project.

Chicago Area Conservation Initiative, IL

The Nature Conservancy.

An Alliance For People and Nature in Metropolitan Chicago



Location. Metropolitan Chicago
Size of Protection Area. 100,000 Acres in Six Counties
Total Rare or Endangered Species: 181

Ecological Significance

The Chicago region contains the best remnants of tallgrass prairie and grove landscapes east of the Mississippi. These landscapes support a rich diversity of life, including five globally imperiled ecosystems and 181 plant and animal species that are endangered or threatened in Illinois. The Nature Conservancy is part of a public, private, and independent-sector team that has over decades preserved billions of dollars' worth of land in the Chicago area. Today, more than 100,000 acres of land within the forest preserves and state parks of the region represent the largest concentration anywhere of these rare ecosystems. Metropolitan Chicago, urban center that it is, is the most practical place for large-scale protection and restoration of tallgrass grove and prairie biodiversity. Since the turn of the century, when Chicago civic leaders launched the first metropolitan nature preserve system, Chicago has emerged as the first urban area in the world to preserve and reclaim so much of its natural heritage.

Threats

Aggressive non-native species are threatening the survival of native wildlife. Lack of fire, a critical ecosystem process, habitat fragmentation, and a variety of other threats also pose a challenge. Within the next decade, most of the decisions to shape the landscape of the Chicago region will be behind us. Open land that might have connected preserves with wildlife corridors will have filled with residences or commerce. Unmanaged prairie fragments will have vanished under alien brush, along with the genes of the species that depend on them for survival.

Conservation Plan

Expanding its extensive volunteer program already in place in the Chicago area, the Conservancy plans an inter-agency partnership to restore the natural heritage of the region and to establish community participation to maintain biodiversity for generations to come. Partners in the Chicago Wilderness project will organize a grassroots constituency and demonstrate the efficiency of public/private partnerships. Land acquisitions will link core preserves to existing habitat. Business partners are designing corporate campuses and new housing divisions with compatible landscaping and conservation goals. The project is helping to develop the science of ecological preservation by testing new techniques of large-scale ecosystem restoration and species monitoring. The project will also conduct public education and outreach activities to reveal these lands and the species they support as great cultural and natural resources of the Chicago region. The Conservancy envisions Chicago becoming a model for integrating conservation into urban cultural life.

Conservation Update

The Nature Conservancy has always emphasized public and private partnerships. In the Chicago region, the Conservancy has forged collaborative arrangements with agencies such as the Cook County Forest Preserve District, Northeastern Illinois University, and the Chicago Botanic Garden. The Conservancy's Volunteer Stewardship Network has grown to some 4,000 volunteers helping to manage 136 sites in the Chicago area comprising 12,882 acres. The volunteers contributed over 35,000 hours of work in 1991 alone. In part because of the compelling example presented by the volunteers, land-owning agencies and the public are prepared to seek substantially increased resources for acquisition and stewardship of natural lands.

Campaign Progress

The Conservancy has raised more than $500,000 towards its $8 million goal. Many millions more will be contributed by project partners such as county and state land-owning agencies and established cultural and educational institutions. A gift of $100,000 from the Searle Family Trust has recently launched the full Chicago Wilderness Campaign. Donors to pilot programs and planning efforts include Robert R. McCormick Foundation, Amoco Foundation, and Alfred and Grace Bersted Foundations.

Goal: $8 Million
Raised: $500,000

Major Donors:

Searle Family Trust

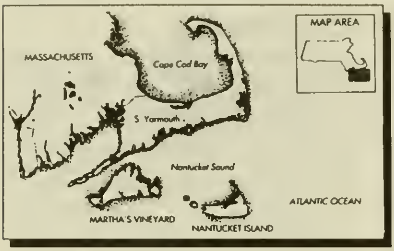
Amoco Foundation

Alfred and Grace Bersted Foundation

Contact: Illinois Field Office, (312) 346-8166

Coastal Sandplains of Martha's Vineyard/Nantucket, MA

The Nature Conservancy.



Location: Off the Coast of Massachusetts
Size of Protection Area: 80,000 Acres
Total Rare or Endangered Species: 20+

Ecological Significance

In the centuries since the last Ice Age, fire swept periodically across the sandplains of the Massachusetts offshore islands, helping maintain extensive grasslands and heathlands. Many plants and animals that flourish as parts of sandplain communities are especially adapted to grasslands. As the human population increased, however, settlement and development fragmented the sandplain habitats and suppressed the natural fire regime. As the sandplain grassland habitats have dwindled, the species that had become particularly adapted to them have become rare, some of them globally rare. As a result, it has become increasingly urgent to protect the natural communities of the coastal sandplains.

Threats

The threats faced by the sandplain communities all stem from habitat fragmentation, the introduction of non-native species, the suppression of fire and interruption of other natural processes, and the lack of coordinated land management.

Conservation Plan

Twenty-five percent of Martha's Vineyard and 33 percent of Nantucket are in conservation ownership. Coordinated research and management of these areas have just begun. The Nature Conservancy is working with a coalition of conservation groups to develop a comprehensive plan to protect the natural communities of the coastal sandplains. Protection strategies will be governed by our understanding of the dynamics of sandplain ecosystems. Through a combination of research, coordinated land management, land acquisition, habitat restoration, voluntary land management agreements, and public education, The Nature Conservancy aims to safeguard the land, species, and systems that define these natural communities. Our success will depend entirely on effective partnerships with local communities and conservation organizations.

Conservation Update

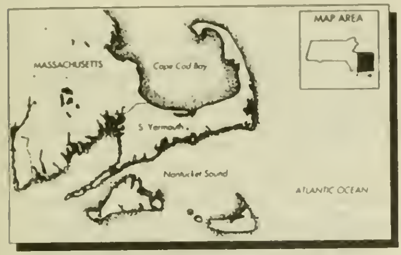
The Conservancy is in the process of developing a model of the dynamics of coastal sandplain ecosystems. A coordinated mapping project of the natural, economic, and political features of the islands is underway. The Conservancy also is conducting prescribed burning and mowing regimes to restore grassland areas. Research is proceeding to better understand which protection strategies are best suited to which target sites.

The Nature Conservancy has not yet established its fundraising goals for this project.

Contact: Massachusetts Field Office, (617) 423-2545

Coastal Plain Ponds of Cape Cod & Plymouth, MA

The Nature Conservancy.



Location: Southeastern Massachusetts
Size of Protection Area: A Range-wide Initiative on Scattered Locations
Total Rare or Endangered Species: 21

Ecological Significance

Coastal plain ponds are glacially formed depressions. Because these ponds are neither fed nor drained by streams, the plants around coastal plain ponds are dependent on ground water. Even under natural conditions, ground water levels fluctuate markedly. As a result, the species of plants on the shores of these ponds are adapted to these fluctuations. They enjoy a competitive advantage only in this very specialized habitat, so they are extremely limited in their range and vulnerable to severe alterations in hydrology or other disturbances. The natural communities around coastal plain ponds are unique and include species that are very rare — many of them globally rare.

Threats

There has been a dramatic increase in the human population of Cape Cod and Plymouth County. As a result, the demand for water has also increased dramatically, and this affects ground water levels. The discharge of greater and greater volumes of waste water have also had an unfortunate impact on the quality of the water in the local aquifers. These are matters of concern for the human population, and they are also immediate threats to the highly specialized and vulnerable plant communities around the coastal plain ponds.

Conservation Plan

The most important strategy in the Conservancy's plan to preserve these unique natural communities will be to increase our understanding of the relationship of ground water to the underlying requirements of these natural communities. Consequently, a key goal of the conservation plan will be to collect reliable scientific data that can then be used to help guide local efforts in planning economic development. In addition, we will seek to educate the local community about the implications of increased water demand so that the needs of a growing human population and the requirements of the natural communities around the coastal plain ponds can both be met. The Nature Conservancy aims to achieve this through research, land acquisition, education, and long-range planning with local officials and water companies.

Conservation Update

The Nature Conservancy has identified the most ecologically significant coastal plain ponds, and has acquired some important shoreline habitat. We have initiated scientific research to help understand these systems and steer our protection strategies. We have also been asked by officials in Barnstable to participate in a planning process that will advance the protection of the coastal plain ponds in that town and serve as a model for other towns.

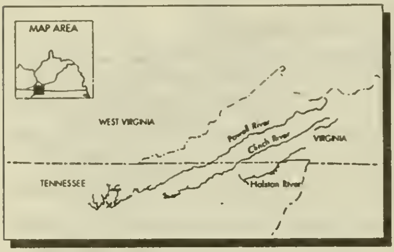
The Nature Conservancy has not yet established its fundraising goals for this project.

Contact: Massachusetts Field Office, (617) 423-2545

Clinch Valley Bioreserve, VA

The Nature Conservancy.

The Cradle of Biodiversity for the Eastern United States



Location: Southwest Virginia
Size of Protection Area: 2,200 Square Miles
Total Rare or Endangered Species: 136

Ecological Significance

Within the Clinch Valley Bioreserve, one can find one of the greatest concentrations of rare species in the United States. More than 136 rare and endangered species can be found in the watershed's four ecosystems. From the freshwater mussels in the gravel shoals of the Clinch and Powell Rivers, to the rare cave invertebrates nestled within the interstices of the expansive subterranean ecosystem, the Clinch Valley Bioreserve is a haven for animal species found nowhere else on earth. Additionally, the unique microhabitats found on the breathtaking cliffs that tower above the Clinch and Powell Rivers harbor several globally rare plant species.

Threats

Even with this unprecedented degree of biodiversity, the rare species of the Clinch Valley have suffered greatly from numerous and insidious sources of stress. A number of point and non-point sources of pollution threaten the integrity of Southwest Virginia's unique waterways. Non-sustainable farming practices, industrial pollution, and even the invasion of exotic species have stressed the region, putting the valley's irreplacable flora and fauna in peril. Researchers from Virginia Tech have agreed that unless water quality trends are reversed, twenty freshwater mussel species may become extinct in the next ten years. Scientists in the Bioreserve are just beginning to assess the impact of these various sources on the plants and animals that thrive here; it is imperative that further research be conducted to determine the causes of water quality degradation, and the accompanying species decline.

Conservation Plan

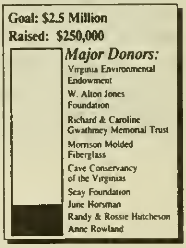
The Conservancy will implement both traditional and innovative stewardship techniques to protect the 2,200-square-mile Clinch Valley Bioreserve. Although traditional land acquisition of biologically sensitive lands will be an important goal, the Conservancy recognizes that it cannot protect the entire ecosystem on its own. The participation of residents, landowners, businesses, municipalities and others is vital to ensure the watershed's survival. The Conservancy also recognizes that thousands of people depend upon the watershed's resources for their livelihood. Compatible and sustainable economic development will be investigated and promoted. Conservation partners are also crucial to the plan's success. These include 44 different entities from the federal to the grassroots level, including state agencies, local governments, universities, local conservation groups, and private citizens.

Conservation Update

The Conservancy is working with farmers, landowners, and industries to minimize activities that adversely affect the watershed. It recently launched a public awareness campaign to emphasize the importance of protecting the Clinch Valley. Residents were given opportunities to participate in hands-on land protection activities. The Conservancy also continues to work cooperatively with municipalities to conduct environmentally compatible land-use planning, upgrade sewage treatment facilities and increase awareness of significant natural resources in Southwest Virginia.

Campaign Progress

Since launching its campaign to protect the Clinch Valley six months ago, the Conservancy has raised approximately $250,000 toward its $2.5M goal. These funds have allowed us to continue to acquire and manage significant sites and launch imperative regional research initiatives. Leadership gifts from the Virginia Environmental Endowment, W. Alton Jones Foundation, Richard Gwathmey and Caroline T. Gwathmey Memorial Trust, Morrison Molded Fiberglass, the Cave Conservancy of the Virginias, the Seay Foundation, June Horsman, Randy and Rossie Hutcheson, and Anne Rowland have fueled the Conservancy's protection efforts in the Clinch Valley.



Goal: $2.5 Million
Raised: $250,000

Major Donors:
- Virginia Environmental Endowment
- W. Alton Jones Foundation
- Richard & Caroline Gwathmey Memorial Trust
- Morrison Molded Fiberglass
- Cave Conservancy of the Virginias
- Seay Foundation
- June Horsman
- Randy & Rossie Hutcheson
- Anne Rowland

Contact: Virginia Field Office, (804) 295-6106

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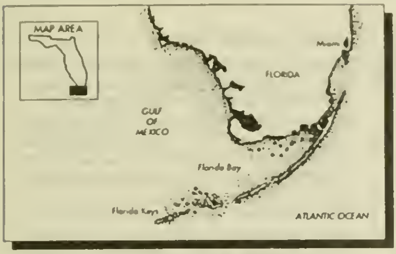
March, 1993

Florida Keys, FL

The Nature Conservancy.

The only tropical ecosystem in the continential U.S.



Location: From Soldier Key Near Miami, Extending 220 Miles to the Dry Tortugas in the Gulf of Mexico
Size of project area: 3,000 Square Miles
Total Rare or Endangered Species. 96

Ecological Significance

The Florida Keys form the only tropical ecosystem in the continental United States. Rare communities such as tropical hardwood hammocks and pine rocklands provide habitat for almost 200 different species, including the endangered Key deer, Lower Keys marsh rabbit, American crocodile, and Schaus' swallowtail butterfly. The Keys' famous coral reef, a delicate structure consisting of living corals, is the most diverse type of marine ecosystem. It is second only to a tropical rain forest in the number of species it supports. The reef system of the Florida Keys supports more than 100 species of coral and 400 different kinds of fish.

Threats

The health of the Keys marine ecosystem has declined dramatically. More than 80,000 people live on the islands year-round, but in winter, the population doubles. Tourism, which brings in millions of dollars annually, is taking its toll on the ecosystem's resources. The problem results from ill-informed behavior by the countless scuba divers, snorkelers, boaters, and fishermen who visit the area annually. Water pollution from both mainland Florida and the Keys seriously degrades the vitality of the coral reef, seagrass beds, and mangrove wetlands. Most scientists agree, however, that the biggest threat to the Keys marine ecosystem is the hot, excessively salty water from Florida Bay. Residential development threatens the tropical hardwood hammocks that support migratory birds such as the white-crowned pigeon. Development also threatens the imperiled pine rockland forests of Big Pine Key, essential habitat for the Key deer and a multitude of species found nowhere else in the world. Development decreases the likelihood of naturally occurring fires, critical to the health of the ecosystem.

Contact: Florida Keys Office, (305) 296-3880

Conservation Plan

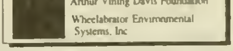
To protect the fragile Keys ecosystem, the Nature Conservancy has launched "Keep the Keys," a four-year campaign to raise $5.5 million in private philanthropic capital. The Conservancy has identified three natural communities of foremost concern under the "Keep the Keys" campaign: the coral reef ecosystem, the endangered tropical hardwood hammocks (found predominantly on North Key Largo), and the pine rockland forests found only on Big Pine Key and adjacent islands.

Conservation Update

The Nature Conservancy has already saved more than 7,000 acres of environmentally sensitive land in the Keys. It will lead the way in protecting and managing all the remaining natural areas in the Keys. The Conservancy's stewardship program will provide inventories of protected sites, monitor rare species, restore damaged areas, and implement much-needed management, such as prescribed burning. The Conservancy will continue to spearhead efforts to bring expert management and protection to Keys waters. It helped design the recently established Florida Keys National Marine Sanctuary. With its partners, the Conservancy will address water pollution problems by developing solutions such as better wastewater treatment. The Conservancy is also expanding volunteer and internship opportunities in the Keys to engage the local community and foster conservation as a way of life.

Campaign Progress

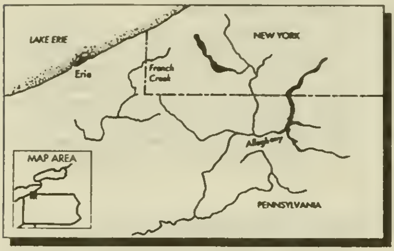
Through the support of private foundations, corporations, and individuals, the Conservancy has raised a total of $2,981,395 for its terrestrial and marine programs in the Florida Keys. Major donors include the John D. and Catherine T. MacArthur Foundation, the Mary Flagler Cary Charitable Trust, the Pew Charitable Trusts, the George B. Storer Foundation, the Knight Foundation, the Perkins Charitable Foundation, the Arthur Vining Davis Foundation, and Wheelabrator Environmental Systems, Inc. The Conservancy hopes to achieve its $5.5M goal within the next three years.



French Creek Watershed, NY & PA

The Nature Conservancy.

A Northeastern Refuge for the Biodiversity of the Mississippi Drainage



Location: Western New York & Pennsylvania
Size of Protection Area: 1,000 Square Miles
Total Rare or Endangered Species: 98

Ecological Significance

Home to 66 species of fish as well as 25 mollusk species, French Creek has long been recognized as one of the most biologically diverse aquatic systems in the northeast. From its headwaters in the southwestern corner of New York State, French Creek travels more than 100 miles before emptying into the Allegheny River in western Pennsylvania. Along the way, French Creek and its watershed provide habitat for a number of globally rare species, including the bald eagle and the Northern riffle shell mussel.

Threats

French Creek's watershed is characterized by variety. The rolling hills of this region are home to numerous farms and woodlots as well as small cities and towns. Variety also characterizes the threats that face French Creek's flora and fauna. Declining water quality threatens many of the mussel species found in the watershed. Improper farming practices, industrial pollution, and urban development have all placed increasing stress on this aquatic system. At the same time, habitat destruction threatens other fragile natural areas located within the watershed.

Conservation Plan

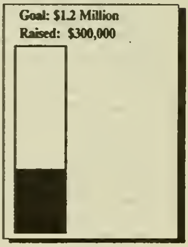
Partnerships will be the key to the Conservancy's efforts to protect French Creek. The Conservancy will work closely with the like-minded Western Pennsylvania Conservancy, along with a variety of other public and private organizations. These activities will include not only traditional land acquisition strategies, but also the development of new, creative approaches to watershed protection. Recognizing that thousands of people live within the watershed, the Conservancy will focus on cooperative strategies that will improve water quality while encouraging compatible economic development. Initially, the Conservancy will focus its efforts on French Creek's New York headwaters while at the same time working to develop an integrated interstate effort with its partners.

Conservation Update

The Conservancy has already acquired a 90-acre anchor preserve on Upper French Creek that will soon be opened to the public. Efforts have also focused on increasing local landowners' awareness of the significance of Upper French Creek through individual contacts. Initiation of a long-term biological monitoring program has already increased our understanding of this complex aquatic system. To move forward on all of these efforts, additional staffing is called for. The hiring of a French Creek Project Director is expected in the near future.

Campaign Progress

The receipt of an anonymous $200,000 grant has allowed the Conservancy to estabish its French Creek Preserve and also hire a project manager. Slightly more than $100,000 in state-funding has facilitated the acquisition of 370 wetland acres within the watershed. The Conservancy hopes to raise an additional $900,000 for the first phase of the French Creek project.



Contact: New York/Central/Western Field Office, (716) 546-8030

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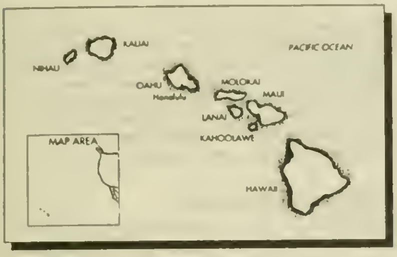
March, 1993

The Hawaiian Forest Challenge, HI

The Nature Conservancy.

Saving the only Tropical Rainforests in the 50 United States



Location: The Hawaiian Islands
Total Rare or Endangered Species: At least 519

Ecological Significance

The Hawaiian Forest Challenge focuses on protecting large areas of Hawaii's remaining forests — the only tropical forests in the fifty United States. These forests protect essential watershed areas and include the great majority of critical habitat for all 19 endangered Hawaiian forest birds as well as more than 500 other rare plant and animal species.

Threats

With the greatest concentration of rare and endangered species in the United States, Hawaii is in a race against time. Due to a range of complex threats, today more than 40 percent of the birds and 34 percent of the plants on the federal endangered species list are Hawaiian. Nearly 75 percent of the recorded plant and bird extinctions in the nation have been Hawaiian species. The most serious threat to Hawaii's ecosystems today are the alien pests that are being introduced at a rate 200,000 times greater than natural. As a result, the conservation of Hawaii's rainforests and 10,000 native plant and animal species found nowhere else on Earth focuses primarily on the prevention and control of alien pests. Wildfire, stream diversion, overharvesting of forest and stream resources, and other inappropriate human uses are also cause for concern in some areas.

Conservation Plan

The urgency of the extinction crisis in Hawaii demands that The Nature Conservancy pursue strategies that have the greatest potential to increase protection for all sites and, wherever possible, to protect biological diversity throughout the state. Fighting back the invasion of alien species depends on two statewide strategies: innovative partnerships among state, federal, and private landowners focused on removing or controlling the spread of alien species in key areas; and improved quarantine and inspection systems to reduce the flow of new pests into the state and between islands. The plan also calls for increased efforts to restore damaged ecosystems and greater public participation through internships, volunteer, and hiking opportunities. State funding will be used to encourage landowners to protect resources on private lands. Only if local communities, government, and private landowners work together will Hawaii's rainforests be protected for future generations.

Conservation Update

In 1991, the Conservancy's Hawaii chapter issued a joint report with federal and state protection agencies. Entitled Hawaii's Extinction Crisis, the report called for increased partnerships to ensure the survival of Hawaii's natural resources. Since then, progress has been made on several fronts, including the establishment of an 8,661-acre preserve, protecting the West Maui watershed; passage of the Alien Species Prevention and Control Act, which allows for screening of suspect parcels entering Hawaii; the development of a Conservation Careers Internship Program; and development of the state's first standard resource monitoring program. An exchange program with New Zealand conservation biologists has also been initiated.

Campaign Progress

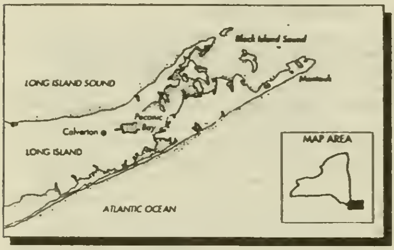
Essential planning support has been generously provided by the MacArthur Foundation and the Barbara Cox Anthony Fund. Regional conservation strategies for key sites and a coordinated campaign plan should be developed by the end of 1993.

The Nature Conservancy has not yet established its fundraising goals for this project.

Contact: Hawaii Field Office, (808) 537-4508

The Peconic Bioreserve, NY

Long Island's Natural Jewel



Location: Eastern Long Island
Size of Protection Area: 575,000 Acres
Total Rare or Endangered Species: 154

Ecological Significance

With 154 different species of plants, animals, and natural communities, the region targeted by The Nature Conservancy's Peconic Bioreserve hosts the greatest concentration of rare species in New York. The three ecosystems that make up the project area include the 80,000-acre pine barrens, the Peconic Bay itself, and the coastal habitats flanking the estuary. Of greatest significance are the dwarf pine plains, a unique forest type found only here and in the New Jersey Pinelands. These habitats shelter a host of endangered species including sea turtles, roseate terns and piping plovers. They also play a vital role in protecting the largest source of pure drinking water in Long Island.

Threats

As one of North America's prime resort areas, the Peconic region is buckling under intense developmental pressures. Overuse of groundwater reserves, nonpoint-source pollution from agricultural runoff and increased development and habitat fragmentation are among the most dangerous threats facing the Peconic.

Conservation Plan

The Conservancy has identified 12 core areas that harbor the most significant concentrations of rare species and natural communities within the bioreserves boundaries, including the central pine barrens (east of Brookhaven). Within these areas The Nature Conservancy will pursue its traditional protection strategies of land acquisition, stewardship, and partnerships with other conservation land owners. Representative core areas include the central pine barrens (south and west of Riverhead), the Long Pond Greenbelt in Bridgehampton and Long Beach Bay/Orient Beach in Orient. Outside the core areas —where many of the residents of eastern Long Island still make a living off the land and water or in the tourism trade—the Conservancy will begin to work with local governments and civic and business groups to encourage economic development that is compatible with the protection of the areas ecological integrity so that traditional land-and water-based industries such as farming and fishing can continue to prosper.

Conservation Update

Within the last year, the Conservancy has expanded its scientific expertise to include fire ecology in its management plan for the Peconic. Fire has long been recognized by ecologists as an important, beneficial force in pine barren communities. Without fire, the pine forest gradually shifts to oak; as a result, habitat for some of the most globally imperiled species is lost. To date, the Conservancy has conducted a number of controlled burns on Long Island and, with Suffolk County, is planning for several more. Additional scientific studies include ground water research in the coastal plain ponds. These fragile ponds, centered at Calverton, the Peconic River headwaters, and the Long Pond Greenbelt, support the highest concentration of species diversity within the bioreserve. Understanding the hydrology of the ponds is critical to determining a successful protection strategy for them. In cooperation with many partners, the Conservancy is a participant in the National Estuary Program for the Peconic Estuary. This recent designation by the EPA will bring greatly needed federal funds to study the threats to the estuary. The Conservancy will also initiate an economic analysis of eastern Long Island to identify compatible economic activities.

Campaign Progress

The five-year fundraising goal for this ambitious project is $13 million. The immediate start-up costs are $2.5 million, of which $1.5 million is for private land acquisition. An additional $4.2 million in public funds for land acquisition is needed. To date, the Conservancy has raised $1,725,000 from generous individuals and foundations, including the Bodman and Hoffman Foundations and the Back at the Ranch Concert, among many others. In addition, a gift of land valued at $3 million is expected to form the centerpiece of the Montauk Point Core Area.

Goal: $13 Million
Raised: $1.7 Million

Major Donors:

Bodman Foundation

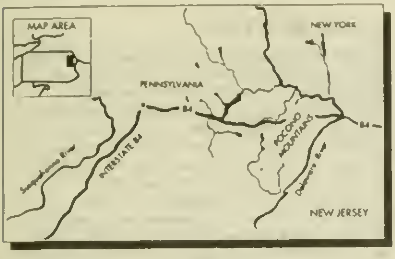
Hoffman Foundation

Back at the Ranch Concert

Contact: Long Island Field Office, (516) 367-3225 and South Fork/Shelter Island Field Office, (516) 725-2936

Pocono Mountains, PA

The Southernmost Intact Glaciated Landscape in the Eastern U.S.



Location: Northeastern Pennsylvania
Size of Protection Area: 300 Square Miles
Total Rare or Endangered Species: 110

Ecological Significance

The Pocono Plateau and nearby mountain ridges are the southernmost intact glaciated landscape in the eastern United States. This boreal island supports vast peatlands, old-growth forests, and an abundance of both rare and common species, including river otters and gigantic black bears. The centerpiece of the Poconos' boreal heritage is the Long Pond ecosystem: 31-square miles of swamps, marshes, upland forests, and fire-dependent oak-pine barrens and heathlands. One of the community types, the Pocono till barrens, occurs nowhere else on earth. The barrens support seven globally rare species and 25 state-imperiled species. The barrens are distinguished by a unique mix of both wetlands and upland species that paradoxically occur side-by-side. One of the wetland plants is rhodora, a beautiful wild azalea more abundant here than anywhere else in the world.

Threats

The Poconos are only two hours from both New York City and Philadelphia. There has been a boom in haphazard commercial, residential, and highway development that threatens this unique area. Some of the habitat has already been lost to second-home developments. Suppression of wildfires has degraded parts of the barrens ecosystem and water pollution could harm both wetland and barrens. Because the Conservancy's focus area lies just beyond the current extent of development, the need for prompt conservation action is urgent.

Conservation Plan

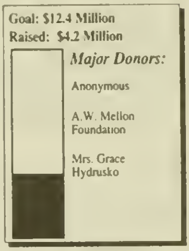
The Conservancy's first priority is to improve its understanding of the region's ecosystems and biota through scientific research in order to identify and protect key areas. The Conservancy also plans to accelerate land-acquisition and land-management projects; develop and promote programs to protect water resources; identify and encourage economically viable land uses that are compatible with land conservation; and build partnerships with community groups and local municipalities to carry out its objectives.

Conservation Update

Since the mid-80s, the Conservancy has acquired 6,700 acres in the Poconos and recently opened a Pocono office with full-time staff. The Conservancy has forged active cooperative relationships with more than 30 organizations: civic groups, government agencies, business associations, a major research institution, and fellow conservation groups. The Conservancy has worked closely with the Pocono community and the Pennsylvania Department of Transportation to promote transportation planning that is compatible with conservation of irreplaceable natural resources.

Campaign Progress

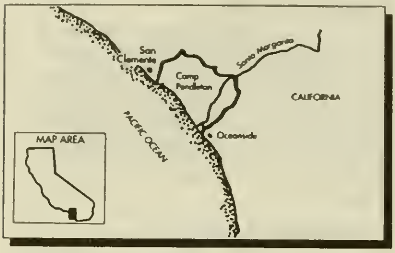
Through the support of private individuals, corporations, and foundations, the Conservancy has raised a total of $4.2 million for land acquisition and stewardship needs. The funds have enabled the Conservancy to protect 4,049 acres at three sites. Another 779 acres have been protected by private landowners and the Conservancy through conservation easements. The Conservancy hopes to raise a total of $12.4 million by December 1995.



Contact: Poconos Office, (717) 646-3326

Santa Margarita River, CA

Southern California's Healthiest River Corridor



Location: Southern California
Size of Protection Area: 540,000 Acres
Total Rare or Endangered Species: 9

Ecological Significance

The only major undammed river in coastal southern California, the Santa Margarita flows for some 27 miles through steep granite canyons, rolling oak woodlands, and wide flood plains before emptying into the Pacific Ocean through 92 acres of rare coastal wetlands. Here in the backyard of greater Los Angeles and San Diego flourish a host of threatened and endangered species, including the California least tern, the San Diego horned lizard, the California gnatcatcher and Cooper's hawk. In addition, the thick willow and cottonwood groves support at least one-quarter of all breeding pairs of the least Bell's vireo, a federally endangered songbird. The dense vegetation and open woodland of the river valley help provide a critical corridor for the wide-ranging California mountain lion, which helps ensure the genetic diversity necessary for the survival of the last populations in the south coast region.

Threats

Although most of the banks of the Santa Margarita are already public owned, the river still faces severe threats. The river itself is threatened by channelization, vegetation removal, water supply projects, and increased water withdrawal. This results in higher flood peaks, changes in the downstream flow regime, erosion, sedimentation and lower water quality — changes that downcut the river, lower the water table, and lead to the destruction of riparian habitat. These negative effects nullify much of the river's ability to provide safe routes to the other ecosystems in the area for migrating wildlife. Runoff from neighboring farms also poses a threat in the river's upper reaches.

Conservation Plan

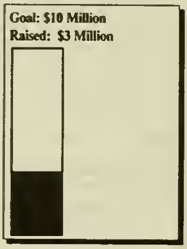
The Conservancy plans to implement traditional and innovative land stewardship practices along the Santa Margarita. It also plans to work with landowners to educate them about the ecological value of their properties and to protect vital lands on or near core areas through purchase, conservation easement, or multiple-use strategies. The Conservancy has been working with various partners, both public and private, to meet these goals. One of the primary goals of the Conservancy is to ensure the long-term viability of existing public and/or private protected land. To this end, it is considering the conservation of the habitat corridors that connect these areas and allow species migration and ensure genetic diversity.

Conservation Update

Since 1982, the Conservancy has protected some 7,200 acres of Engleman oak, bunchgrass prairie, and riparian habitat. Recently, using money awarded through an ambitious California Department of Transportation program, the Conservancy was able to protect roughly 50 percent of the remaining private lands along the river. With the on-going help of local government, citizens' groups, farmers, and landowners, the Conservancy continues to help play a major role in the long-term protection of one of the most intact, ecologically significant areas on the southwest coast.

Campaign Progress

The Nature Conservancy acquired key riverfront acreage with a grant from the California Transportation Commision that ensures the continuity of otherwise fragmented natural communities. In addition, land management agreements with Camp Pendleton Marine Corps Base enable the Conservancy to share conservation strategies with previously unlikely partners.

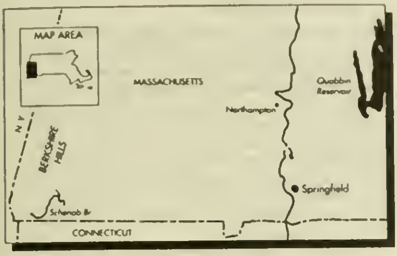


Contact: California Regional Office, (415) 777-0862

Southern Berkshires, MA & CT

The Nature Conservancy.

A Sweet Water Refuge in Massachusetts



Location: At the Intersection of Massachusetts, Connecticut and New York
Size of Protection Area: 21,000 acres
Total Rare or Endangered Species: 45

Ecological Significance

Nestled in the southern Berkshires — where Massachusetts, Connecticut and New York come together — are the Schenob Brook and Karner Brook watersheds. These 21,000 acres of waterfalls, ravines, rock outcrops, rolling hills, swamps, and streams hold the highest concentration of rare and endangered species in Massachusetts. At least 45 rare species inhabit these watersheds, the largest and most pristine of their kind in all of New England. Although the rain that falls in the southern Berkshires is among the most acidic in the nation, the limestone bedrock buffers the water. The resulting sweet water wetlands harbor a multitude of rare plants and animals, in stark contrast to the nearly sterile lakes in the northeast rendered lifeless by acid rain.

Threats

Water, specifically the hydrology that these ecosystems provide, is the key to the survival of the fragile natural communities of the Schenob Brook and Karner Brook watersheds. Increasing development pressures, sand and gravel mining, and unsound agricultural and forest management practices threaten to disrupt the natural water filtration system, add unnatural nutrients, increase the turbidity of the water and change its pH. Whatever adversely affects the hydrology threatens the whole ecosystem.

Conservation Plan

In partnership with local communities, state agencies and other conservation organizations, The Nature Conservancy will employ a variety of protection strategies to preserve this entire functioning ecosystem. By acquiring the most sensitive core areas, undertaking scientific research and science-based land-management projects, obtaining voluntary land-management agreements with local land owners, and promoting governmental action and public outreach, the Conservancy aims to encourage sustainable economic development and, at the same time, safeguard the natural communities and the natural systems that define this ecosystem. Effective partnerships will be essential to the success of this large-scale, complex effort.

Conservation Update

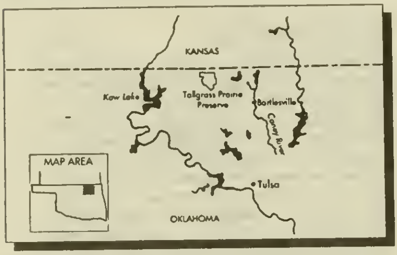
So far, regulatory protection has been achieved for almost the full expanse of both watersheds. More than $1 million has been raised and 700 acres of the most sensitive core areas have been acquired. The Conservancy has created and endowed a permanent bioreserve manager position. And the Conservancy has begun to forge encouraging partnerships with most of the key agencies, organizations and local constituencies in the region.

The Nature Conservancy has not yet established its fundraising goals for this project.

Contact: Massachusetts Field Office, (617) 423-2545

Tallgrass Prairie Preserve, OK

An Ocean of Grass, Shaped by Fire and Bison



Location: 55 miles northwest of Tulsa, Oklahoma
Size of project area: 30,000 acres

Ecological Significance

The Nature Conservancy's Tallgrass Prairie Preserve anchors the southern end of the greatest stretch of tallgrass prairie remaining in North America. Tallgrass prairie once covered more than 142 million acres on the continent, one of the most extensive of its natural systems. But today only 10 percent remains, and much of that in scattered fragments and old railway rights-of-way scattered throughout the United States and Canada. The namesake tall grasses of this ecosystem — big bluestem, Indian grass and switch-grass — grow as tall as 10 feet, but are only part of a complex system that supports hundreds of other plant species. (More than 500 different plants have been identified at Tallgrass.) Among the animals that inhabit the tallgrass prairie are Swainson's hawks, greater prairie chickens, and bobcats.

Threats

Conversion to cropland and other types of development have claimed more than 90 percent of the original tallgrass prairie in North America. Improper cattle grazing has reduced plant and animal diversity and increased soil erosion. Other threats to tallgrass are herbicides and the introduction of exotic plants, which compete with native plants. Lack of fire, a natural ecological force on the prairie, accounts for the steady encroachment of scrub oak, which shades the prairie and reduces diversity.

Conservation Plan

The goal of The Nature Conservancy's Tallgrass Prairie Preserve is to restore a functioning tallgrass prairie ecosystem. The cornerstone of this effort will be to recreate the historic interaction of fire and bison with the prairie. Both of these factors are critical to the long-term health of the tallgrass prairie ecosystem: fire burns off invading species and excess , while the indiscriminate grazing behavior of bison invigorates new plant growth. Other plans underway include the reconstruction of a 50-mile scenic drive through the preserve, which the Conservancy hopes will attract tourists. The Osage Indians, who own the mineral rights on the preserve, will continue to drill for oil and gas.

Conservation Update

For the past two years, the Conservancy has allowed the prairie to rest from cattle grazing. In addition, the Conservancy acquired an additional 1,000 acres to add to the Preserve. In the spring of 1993, the Conservancy will conduct a prescribed burn on some 22,000 acres at Tallgrass to remove accumulated vegetation and invasive species, and regenerate native grasses. Following the burning cycle, the Conservancy will run about 8,800 head of cattle on 22,000 acres under a short-duration/high-intensity grazing plan. In the fall, the Conservancy plans to introduce 300 bison at Tallgrass, the first animals in a herd that will eventually reach 1,800. The initial bison herd will be restricted to a 5,000-acre enclosure, which the Conservancy is currently fencing. As more bison are added in the future, cattle grazing will be phased out.

Campaign Progress

The Conservancy is seeking to raise $15 million to support its efforts at Tallgrass. These funds will be used for land acquisition, including helping defray the cost of the 30,000-acre ranch that forms the core of the preserve, as well as to cover the start-up costs associated with building the bison herd. In addition, the Conservancy hopes to create an endowment to underwrite long-term management of the property.

Goal: $15 Million
Raised: $8.6 Million

Major Donors:

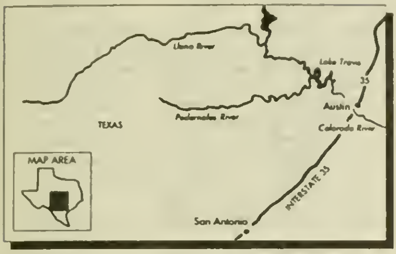
- Kerr-McGee Corporation
- The Williams Companies
- Ken-Ada Ranches, Inc.
- Phillips Petroleum
- Burlington Resources
- Miller Brewing Company
- Robert S. and Grayce B. Kerr Foundation

Contact: Tallgrass Prairie Preserve, (918) 287-4803

Texas Hill Country, TX

Helping Protect the Best of Texas

The Nature Conservancy.



Location: South Central and West Central Texas
Size of Protection Area: 18,650 Square Miles
Total Rare or Endangered Species: 97

Ecological Significance

The Texas Hill Country Project encompasses several closely interrelated terrestrial and subterranean ecosystems. Not only are the Hill Country's physical and biological resources integrated across the landscape, but they also are linked vertically to one of the world's largest and most biologically rich limestone aquifers — the Edwards Aquifer. This system currently supports between 50 and 60 aquifer-dwelling insects, crustaceans, amphibians, and fish that exist only in this spot. The Hill Country's high-quality rivers and creeks flow south and east through oak-juniper savannah and steep canyons, provide habitat for globally endangered migratory songbirds and plants, and eventually cross and recharge the Edwards Aquifer.

Threats

The Hill Country's natural beauty and attractive quality of life have caused the local population to soar — particularly related to recreation and retirement. Population growth and suburbanization have isolated and destroyed some plants and habitat essential for migratory songbirds and produced numerous pollution sources that degrade the quality of hundreds of once-pristine streams. Concurrent increases in water withdrawal threaten to lower groundwater levels and cause localized subsurface contamination, both of which affect aquifer-dwelling species. These factors also disrupt the flow of springs, many of which provide habitat for rare and endangered fish, amphibians, and plants.

Conservation Plan

Ecosystem conservation in the Hill Country incorporates two primary strategies: purchasing large core preserves as ecological research and demonstration sites, and introducing a wide variety of non-traditional planning and stewardship techniques to integrate human activity across the 12-million-acre landscape. Because the active involvement of hundreds of private and public partners is crucial to the Conservancy's success, dozens of cooperative projects are being developed and carried out with private landowners, businesses, university researchers, municipalities, state and federal agencies, and local community and conservation organizations.

Conservation Update

The Conservancy is working with the Austin community to implement a regional conservation plan that protects water quality, provides open space and recreational opportunities, preserves habitat for seven endangered and 36 rare species, and restores investment certainty to residential and commercial development. Voters have approved a $22 million bond issue and almost 14,000 acres of land have been secured as part of a planned 29,000-acre preserve system. Work is proceeding to help safeguard critical aquifer recharge areas and devise a regional strategy to balance economic use and environmental values for the region. Research and modeling programs are being developed to assist private landowners in making ecologically sensitive property-management choices.

Campaign Progress

Through the support of private corporations, foundations and individuals, the Conservancy has raised a total of $1.8 million toward its $7.45 million goal for the project. Specific support has also been given to scientific research and water policy development as well as land acquisition and stewardship needs. The funds recently enabled the Conservancy to acquire the 18,552-acre Dolan Falls Ranch. This purchase protects a spectacular riparian system at the western edge of the Hill Country.

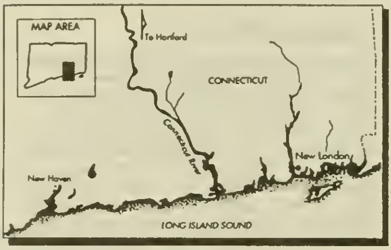
Goal: $7.45 Million
Raised: $1.8 Million

Major Donors:
Lennox Foundation
Tejas Gas Corp
The Albritton and Heldt Families
Exxon
The Arthur Vining Davis Foundations
Rosewood Corp
Miller Brewing Company
Marjorie and Fred Currey
Karen and Tim Hixon
Anonymous

Contact: Texas Field Office, (210) 224-8774

Tidelands of the Connecticut River, CT

Thriving New England Wetlands, Washed by Atlantic Tides



Location: South Central Connecticut
Size of Protection Area: 115,000 Acres
Total Rare or Endangered Species: 43

Ecological Significance

The Lower Connecticut River and its tributaries are home to millions of creatures, including seven plant and animal species that are rare or endangered worldwide. Despite intense recreational and commercial use, the lower Connecticut remains beautiful, with many important natural habitats intact. A sandbar where the river meets the Long Island Sound makes it unfriendly to deep-draft ships, making it one of the only major rivers in the United States without a port city at its mouth. To this day, development on both banks of the lower Connecticut remains relatively sparse. The Connecticut Chapter of The Nature Conservancy is committed to preserving this system of exemplary tidal wetlands, which includes salt, brackish and freshwater marshes — the tidelands — and to protecting the aquatic resources of the lower river's major tributaries.

Threats

The lower Connecticut remains a popular place for residential and marina construction. These activities often result in the destruction of habitat of rare plants and animals, which poses the single greatest threat to the ecological health of the region. Other major threats to the area include water pollution and nuisance species of plants and animals, which may compete with native species for the area's resources.

Conservation Plan

Because many rare species use a variety of habitats in the region for feeding, nesting, roosting, spawning, and migration, the Conservancy seeks to protect the entire range of habitats found in this ecological system, from the water quality of the river itself to the wetlands and uplands. The Conservancy will pursue these goals though its traditional non-confrontational approach to land protection, and also through water-quality monitoring and improvement projects, control of nuisance species, conservation biology research, ecological restoration, and other activities. This work will be carried out in cooperation with local conservation partners.

Conservation Update

For more than three decades, The Nature Conservancy has worked to preserve the resources of this area though land protection and stewardship activities. As of January 1993, the Conservancy had protected 1,905 acres in the region, and had an option to purchase 232 more. The chapter has now begun working with other organizations to expand and intensify these activities. The Conservancy recently completed a two-year biological inventory of the river's watershed. Conservancy staff have begun studying the nuisance plant and animal species that have invaded the area, assessing the extent of their encroachment on the habitat of native plants and animals. The Conservancy has also begun evaluating strategies to control these non-native species and restore the natural communities they threaten.

Campaign Progress

Thus far, The Nature Conservancy's Connecticut Chapter has raised more than $580,000 in cash and pledges for the Tidelands Program. The chapter has also received more than 300 acres of land in the region in the form of donations in fee, of easements, and of partial interests in land. The total value of these gifts is estimated at $1.4 million.

Goal: $17.11 Million
Raised: $1.98 Million

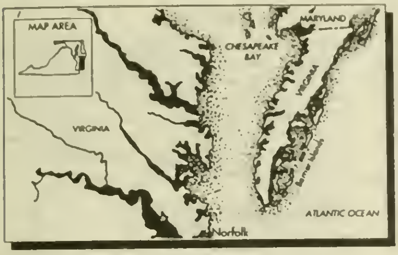
Major Donors:

Bernard and Audrey Aronson Charitable Trust
Carolyn Foundation
Mr. and Mrs. William M. Goadby
Mr. Anthony P. Grassi
Mrs. Helen F. Hamlen
Miss Dorothy M Hooker

Contact: Connecticut Field Office, (203) 344-0716

Virginia Coast Reserve, VA

A Working Model for Ecosystem Conservation



Location: Virginia's Atlantic Coast
Size of Protection Area: 50,000 Acres
Total Rare or Endangered Species: 3

Ecological Significance

An intact system of fourteen barrier islands, mainland farms and coastal marshes, the Virginia Coast Reserve is one of the richest natural treasures on the East Coast. The coastal bays between the mainland and the barrier islands comprise the finest coastal aquatic system in the East and are a rich spawning ground for fish and shellfish. The barrier islands also provide shelter for more than 250 species of raptors, songbirds, shorebirds and wading birds. In the spring, pods of bottlenose dolphin migrate along the Atlantic waters off the islands and juvenile loggerhead sea turtles summer in the shallow coastal bays.

Threats

Inappropriate waterfront development and land use would degrade the water quality in the seaside bays and poses the greatest threat to the Virginia Coast Reserve. Although the Eastern Shore has seen little population growth since the early 1900s, the Chesapeake Bay region is growing by more than 85,000 people each year. With population growth and development comes sewage treatment problems, runoff from construction sites, and increased pressure from recreational users and boaters.

Conservation Plan

By working in partnership with the Eastern Shore's local community as well as state and federal institutions, The Nature Conservancy has begun targeting opportunities for compatible economic growth. Through conservation easements and acquisitions, the Conservancy is working to protect the mainland farms that provide a critical buffer zone to the delicate barrier islands of the preserve. Ongoing conservation and research work continues at the reserve's Long-term Ecological Research Station, which was established through a partnership between the Conservancy, the University of Virginia, and the National Science Foundation.

Conservation Update

The Virginia Coast Reserve has been involved with a strategic planning initiative with the Northhampton Economic Forum. The Forum advocates protection of the county's natural and cultural resources, while encouraging it to build "a diverse, prosperous, and self-reliant economy that provides good jobs for all citizens." With assistance from the Environmental Protection Agency and the National Oceanic and Atmospheric Administration, extensive mapping and water-related research is progressing on the mainland. This research will help enhance the design of conservation easements and land-use practices to protect the water quality in the seaside creeks and lagoons. The National Science Foundation recently approved a $1 million grant to continue work of the Long-term Ecological Research Center. A pilot program has been initiated with Old Dominion University covering a wide range of disciplines including an entrepreneurial program involving local businesses.

The Virginia Coast Reserve is seeking "Partners in Protection" — individual, corporate, foundation, and institutional investors — to create a new vision of progress on Virginia's Eastern Shore. The mission is to develop a world-model community that demonstrates how people can live and prosper in harmony with the environment.

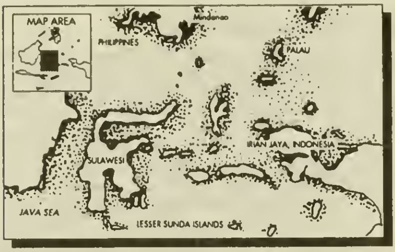
Contact: The Virginia Coast Reserve Office, (804) 442-3049

March, 1993

Lore Lindu National Park and Morowali Nature Reserve, Central Sulawesi Province, Indonesia

The Nature Conservancy.

Indonesia Island Rescue



Location: Indonesian Archipelago, Southeast Asia
Size of Protection Area: 1.1 million Acres on Sulawesi
Total Rare or Endangered Species: Survey Underway

Ecological Significance

Indonesia's forests and reefs are among the richest genetic storehouses in the world. Indonesia is home to more than 10 percent of the world's plant species, 12 percent of its bird species, 12 percent of its mammal species, and 16 percent of its reptile and amphibian species. Currently listed on Indonesia's endangered species list are 126 birds, 63 mammals, and 21 reptiles. Sulawesi, the tenth largest island in the world, harbors one of the highest percentages of endemic plant and animal species in Indonesia, and some of the most diverse marine ecosystems in the entire world. The Conservancy and its partner organizations are focusing efforts on the 570,800-acre Lore Lindu National Park and the 556,000-acre Morowali Nature Reserve — both are home to Sulawesi's major ecosystems and a majority of threatened or endemic species. The Morowali Reserve is also the last stronghold of the aboriginal Towana people.

Threats

Increasing demands of a growing population and accelerating development threaten Indonesia's natural resources. Encroachment by communities surrounding Lore Lindu National Park and unchecked activities of enclave communities continue to threaten the park's integrity. Morowali Nature Reserve, relatively isolated before, is now threatened by agricultural activities, unregulated tourism, and shifting unsustainable agricultural practices within the park.

Conservation Plan

Conservancy programs for Lore Lindu focus on three efforts: sustainable, community-based development projects; park management; and environmental education. Efforts for Morowali Nature Reserve focus primarily on bolstering park management; developing a local environmental education program; and increasing alternative agriculture, and conservation-related tourism where appropriate to generate income for communities associated with the Reserve.

Conservation Update

The Conservancy has formed excellent government and Non-Governmental Organization (NGO) contacts at all levels, which support our program and promote inclusion of conservation goals into provincial land-use planning. Conservancy partnerships have been solidified to carry out the program with the Indonesia government's approval. In addition, the Conservancy hopes to tie in with planned World Bank activities in the area. A socio-economic survey has recently been completed that describes target communities in the parks' buffer zones. Using data from the surveys, projects will be designed to provide communities with alternative sources of income while demonstrating the importance of conservation of the parks. A community conservation awareness program is now being implemented, and will be closely coordinated with the development projects. In addition, a recently completed survey on ecotourism has indicated high potential for nature-based tourism, which would significantly increase local income and awareness of the value of the parks.

Campaign Progress

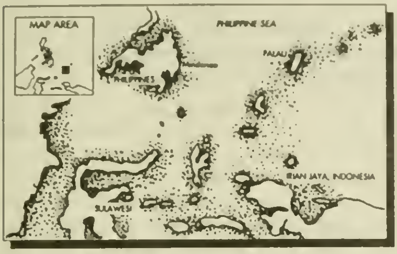
Income from a Ramada Renaissance Hotels and Resorts/American Express cause-related marketing effort, combined with generous grants from Yasuda Fire and Marine Insurance Co., Ltd., the John D. and Catherine T. MacArthur Foundation, and the Homeland Foundation, have underwritten the Conservancy's planning effort in Indonesia, including the Sulawesi Parks Program Land Use and Socio-Economic survey. With the planning phase almost completed, it is time to focus on raising the funds necessary to implement this project.

Contact: Pacific Regional Office, (808) 537-4508

Palau Islands Bioreserve

The Nature Conservancy.

Reef and Rainforest Wonderland



Location: Southwestern Mircronesia
Size of Projection Area: Islands, Atolls, and Coral Reefs Stretching across more than 500 miles of Ocean
Total Rare or Endangered Species: Surveys Underway

Ecological Significance:

The Palau Islands represent a unique natural and cultural complex of unparalleled beauty and biological diversity in Oceania. Palau probably supports more corals, fish, and other invertebrates per unit area of marine habitat than any other area on Earth. An extraordinary barrier reef system protects the island complex and creates a large and productive lagoon. Together, the Rock Islands and Ngeremeduu Bay protect several outstanding natural communities and species, including some 1,400 species of reef fish, 200 species of soft corals, and 400 species of hard corals. The scenic beauty of the Rock Islands, their pristine condition, and the opportunities for nature-based tourism make them the highest conservation priority in Palau.

Threats

The islands are threatened by resort development, soil erosion and runoff on coral reef and mangrove areas, slash-and-burn agriculture, clearing of vegetation for roads and development, and coastal water pollution. Poaching and illegal takes also threaten several rare species. Palau is faced with rapid population changes, including a mass exodus of Palauans seeking better jobs elsewhere and an influx of foreign workers, unfamiliar with local controls that protect rare species. A trust territory subject to U.S. environmental protection laws, it is likely that Palau will soon gain its independence. In that event Palau will no longer be subject to U.S. environmental laws.

Conservation Plan

The Conservancy will devote resources towards protecting populations of key and endangered species including the dugong, saltwater crocodile, endemic forest birds, sea turtles, and giant clams. The plan identifies roles for government, non-governmental organizations (NGOs) and international assistance in developing compatible human uses and economic strategies. The plan emphasizes respect for private land ownership and strong community involvement.

Conservation Update

A team of scientists has already conducted several ecological surveys, including status surveys for key species such as crocodiles, dugongs, forest birds, and fruit bats. These surveys have helped support the case for immediate conservation in Palau and helped prioritize areas for protection by the Palauan government. Working with tour boat operators, the Palau Visitors Authority, and other partners, we have installed mooring buoys to enable scuba diving to take place without further damage to reef ecosystems. A local NGO dedicated to balanced development in Palau is promoting conservation education programs that emphasize habitat protection and sustainable harvest guidelines among audiences that include the local community. The legislature has passed landmark legislation to create a nature preserve system.

Campaign Progress:

Generous grants from the MacArthur Foundation and the U.S. Department of Interior have underwritten the Conservancy's two-year planning effort in Palau, including an environmental assessment of 150 marine sites. Work is underway on a comparable number of terrestrial sites. With the planning phase almost completed, it is time to focus on raising the funds necessary to implement this exciting project.

The Nature Conservancy has not yet established its fundraising goals for this project.

Contact: Pacific Regional Office, (808) 537-4508

OTHER "LAST GREAT PLACES" PROJECTS

March 1993

As The Nature Conservancy's work with the Last Great Places initiative evolves, more detailed information will be available on the following sites. The brief descriptions below outline the main objectives of the Conservancy's conservation efforts in these locations.

DOMESTIC PROJECTS

Cape Cod and Martha's Vineyard/Nantucket, MA

The coastal sandplains and ponds of Cape Cod and the islands off the coast of Massachusetts support a remarkable concentration of plants and animals, some of them globally rare, that are adapted solely to these ecosystems. Formed during the most recent glacial period, the region is characterized by grasslands and heathlands, and by ponds whose levels fluctuate with the rise and fall of groundwater from a single aquifer. But because of increasing development pressure, the area has experienced habitat fragmentation, groundwater depletion and pollution, and a rise in the number of non-native species. The Nature Conservancy is working with a coalition of conservation groups to develop a comprehensive plan to protect the natural communities of these areas. Through a combination of research, land management, and habitat restoration, the Conservancy is coordinating a long-term planning process that aligns the needs of a growing human population with the requirements of the fragile natural communities.

Colorado Plateau, UT

The 109-million-acre Colorado Plateau sprawls across parts of New Mexico, Arizona, Utah, and Colorado in one of the least populated areas of the continental United States. The Nature Conservancy is working with public and private landowners to develop programs to ensure that this vast wilderness area and its multitude of rare plants and animals are protected for future generations. Cattle grazing, mining, and tourism are the primary economic activities on the Plateau. Forging partnerships with these industries, where possible, the Conservancy is exploring ways of maintaining the economic vitality of the region without damaging its most sensitive natural communities. The Conservancy is also working to acquire some private land that shelters outstanding examples of rare species and plant communities. The centerpiece of that effort is the Matheson Wetlands Preserve, a rare desert wetlands that harbors more than 150 species of birds. In addition to addressing economic concerns, the Conservancy is working directly with public agencies to research and protect critical natural areas on public lands.

Gray Ranch, NM

Located in the remote reaches of the bootheel of southwestern New Mexico, Gray Ranch is a 500 square-mile preserve and working ranch that harbors more than 700 plant species and 350 vertebrate species. Bisected by the Animas Mountains, the isolated ranch abuts the Mexican border and contains an unusually rich mix of habitat types, ranging from lush desert grassland to near-Alpine conditions at Animas peak. Herds of Chihuahuan pronghorns regularly inhabit the ranch, and more than 230 species of birds have been sighted there. Mountain lions and black bears are occasionally glimpsed in the ranch's higher elevations. The ranch was purchased from a Mexican corporate owner in 1990 by The Nature Conservancy, the largest private purchase of land in conservation history. Recently the Conservancy entered into an agreement with the locally-based Animas Foundation to guarantee the long-term protection of Gray Ranch. The ranch will be sold to the foundation with the Conservancy holding permanent conservation easements on the acreage. The mission of the Animas Foundation is in consort with the Conservancy's Last Great Places initiative: to preserve the natural diversity and cultural heritage of southwest ecosystems by meshing compatible economic use (controlled grazing) with habitat conservation and restoration.

Horse Lick Creek, KY

The pristine waters of Horse Lick Creek, a tributary of central Kentucky's Rockcastle River, support a high-quality concentration of rare mussels -- the most endangered group of animals in North America. Of the 21 mussel species endemic to the upper Cumberland basin, 18 are extinct, extirpated, or rare; among the endangered mussel species surviving in Horse Lick Creek are the Cumberland bean mussel, the Little-winged pearly mussel, the Purple lilliput, and the Tennessee clubshell. In addition, caves in the Horse Lick watershed harbor several endangered bat species. To help protect the watershed's rare aquatic and terrestrial life, the Conservancy has targeted a 39,000-acre area around Horse Lick Creek for conservation action. Protection priorities include the cave systems in the upper part of the watershed and the mussel beds in the lower reaches of the creek. Key partners in this effort include the Daniel Boone National Forest, which owns 8,000 acres in the heart of the watershed; the Kentucky State Nature Preserves Commission; and local landowners and farmers. The Conservancy is also pursuing rural economic development initiatives that will provide opportunity for local residents while minimizing the threat to the creek.

Lower Roanoke River, NC

Conservationists consider the Lower Roanoke to be the largest and least disturbed bottomland forest remaining in the mid-Atlantic region. Along its 137-mile course across the coastal plain, the river is characterized by an unusually wide and topographically diverse floodplain. These alluvial deposits support at least twenty distinct natural communities, including scattered remnants of old-growth forest that contribute significantly to the floodplain's genetic diversity. The threats to this region are diverse and complex. In addressing these threats, The Nature Conservancy is working with federal and state conservation agencies and local governments to safeguard the environment through continued acquisition in the floodplain and to develop a comprehensive management plan for the protected area. The Conservancy also plans to carry out hydrological research on the river.

Nipomo Dunes, CA

Stretching for nearly eighteen miles along California's central coast, Nipomo Dunes embrace 28,000 acres of undeveloped wetlands and sand dunes. A unique natural community itself, the Dunes also provide critical nesting habitat for shorebirds and are home to a number of rare plant and animal species. The Nature Conservancy's protection strategy for Nipomo hinges on ensuring that the area's current economic base, primarily livestock grazing and oil drilling, continue in an environmentally sound manner. Through partnerships with a combination of public and private partners, the Conservancy currently manages more than 3,500 acres at Nipomo Dunes. In addition, as part of a national agreement with the Department of Defense, Vandenburg Air Force Base has joined with the Conservancy to fund studies on the ecology of the Nipomo dune system, half of which lies within the boundaries of the base.

San Pedro River, AZ

A ribbon of green flowing north across the Sonoran desert in Arizona, the San Pedro River supports a wealth of biological diversity unsurpassed in the southwestern United States. With more than 360 species of birds, nearly half of North America's bird fauna, the San Pedro is an internationally renowned destination for birdwatchers. In addition, the river corridor harbors the most extensive cottonwood-willow and mesquite riparian forests remaining in the Southwest. These habitats serve as a key migration corridor for migratory birds travelling between tropical wintering and temperate breeding areas. But increasing demands from residential, agricultural, and industrial development threaten the San Pedro and its streamside forests. Through partnerships with private landowners and public agencies in both the U.S. and Mexico, The Nature Conservancy is working to ensure the long-term protection of the region, with a focus on promoting the San Pedro's potential as a tourist destination. Conservancy scientists are also participating in water-resource planning by offering technical expertise to private and public land managers and local decision-makers.

The Shawangunk Ridge, NY

The rocky summits of the Shawangunk Mountains contain a unique dwarf pine ridge community found nowhere else. Gnarled and weathered pitch pine trees sculpt the harsh cliffs. Deep crevices in the rock form ice caves that retain snow and ice through the hot summer months, sheltering rare plants that are well south of their normal ranges. Peregrine falcons, wild rhododendron, timber rattlesnakes, and the state-rare Broom crowberry call the Shawangunks home. But the Ridge is experiencing intense recreational and development pressures. Within easy reach of the New York metropolitan area, the Shawangunk cliffs attract thousands of rock climbers and other visitors. The Nature Conservancy has worked to protect the Shawangunks for more than two decades, helping set aside more than 12,000 acres in the area. Yet the long-term survival of the fragile Ridge ecosystem will require protecting some 35,000 acres and reintroducing the Ridge's natural fire regime, now suppressed. To accomplish its goals in the Shawangunks, the Conservancy has joined with numerous public and private conservation organizations in a cooperative effort that seeks to preserve this distinctive landscape and the special diversity of species it harbors.

Upper Colorado River Basin, CO

In a region thirsty for water, dams and water diversions have drastically altered the waters of the Colorado River and its major tributaries--the Yampa, San Miguel, Dolores, White, and Gunnison Rivers. Most of the system's once-turbulent and muddy waters are now tame, and the river seldom reaches its delta on the Gulf of California. But some of the Colorado's tributaries, particularly in the Upper Colorado Basin, have escaped these disruptions. They support healthy natural communities and a diversity of plant and animal species specifically adapted to the natural cycles of the rivers. This represents a rare opportunity to protect and restore critical elements of the Colorado River's native ecosystems. In a region sharply divided over natural resource issues, the Conservancy is working to forge alliances with water developers, livestock operators, mining companies, and tourism interests. The Colorado chapter is raising funds to acquire critically sensitive lands, recruit land stewards, and encourage environmentally sensitive land management.

INTERNATIONAL PROJECTS

Blue Mountains/John Crow Mountains National Park, Jamaica

This park is the first major terrestrial protected area of its kind in Jamaica. Its 193,000 acres incorporate five ecological zones that harbor almost all of the country's 25 endemic bird species and at least 32 species of North America's wintering migrating birds. An estimated 40 percent of the parks flowering plant species are found nowhere else in the world and nearly half of Jamaica's 530 fern species are found in the area. The Nature Conservancy is working with its local Jamaican partner, the Jamaica Conservation and Development Trust to protect this unique area by providing training, financial and technical assistance. The Conservancy is also working with the Natural Resource Conservation Authority of the Jamaican government--the entity that manages the Park--by helping to develop management plans, supporting infrastructure needs, and training park personnel.

The Condor Bioreserve, Ecuador

The Condor Bioreserve covers a vast 1.6 million-acre tract of western Amazonian and Andean ecosystems, including three contiguous protected areas - Cayambe Coca Ecological Reserve, Antisana Ecological Reserve and Cotopaxi National Park. In addition to providing a haven for the largest concentration of endangered Andean condors in Ecuador, this area supports 15 different life zones and is home to threatened species such as the spectacled bear, mountain tapir, puma, and cock-of-the-rock. Several Amazon River tributaries originate in the Condor Bioreserve, which also serve as the principal watershed capital city of Quito, as well as for surrounding Andean communities. The Nature Conservancy is working with Antisana Foundation, Nature Foundation, the Ecuadorian National Park Service, and indigenous and local community groups to protect the Reserve's biological riches.

Darién Biosphere Reserve, Panama

The Darién Biosphere Reserve is one of the largest remaining tracts of unfragmented forest in Central America. Stretching across 1.4 million acres, it harbors five distinct ecological zones which are home to 130 species of mammals, 81 species of fish, 45 species of reptiles and amphibians, 449 species of birds, and more than 1,990 species of plants. The Nature Conservancy is working with local partner ANCON, a private conservation organization, and INRENARE, the Panamanian national park service, to ensure that the Reserve has sufficient personnel and infrastructure. To date, ANCON and INRENARE have constructed three remote ranger stations, surveyed and marked the boundaries of the Reserve, and purchased a house which serves as a ranger base station. ANCON also maintains an active community outreach campaign in the area and has begun purchasing critical rainforest property in the buffer zone that will expand the park area.

Guaraqueçaba Environmental Protection Area, Brazil

Scientists consider the Atlantic rainforest as one of the top three conservation priorities in the world. Initial efforts to protect this remarkably diverse region are focused on the Guaraqueçaba (Gwa-ra-key-sa-ba) Environmental Protection Area. It is the best and largest remnant of the 8.8 percent of the original Atlantic rainforest left on the planet. Located in southeastern Brazil, its 775,000 acres range from mangroves to mountainous tropical forest, embracing a rugged coastal mountain range. Its species of plants and animals are astonishing both in terms of beauty and rarity. Among the threatened species found in the area are the red-tailed parrot, jaguar, ocelot, margay, loggerhead and green sea turtles, woolly spider monkey, the recently discovered black-faced lion tamarin, and more than 1,000 species of plants found nowhere else in the world. The Nature Conservancy has forged an unprecedented alliance with the Boticário Foundation, under which both organizations will contribute $300,000 to protect the reserve. The Conservancy is also working closely with our local partner, the Society for Wildlife Research and Environmental Education (SPVS), to implement an integrated conservation and compatible development plan for Guaraqueçaba.

Jaragua National Park, Dominican Republic

The 339,378-acre Jaragua National Park is the largest protected area in the insular Caribbean. The Park boundaries include terrestrial, coastal, and marine environments, as well as two continental islands--Beata and Alto Velo islands. But charcoal production, cattle ranching, overfishing, and feral animals threaten the biological diversity of the area, which includes 26 endemic reptile and amphibian species and 10 endemic bird species. The Conservancy has a formal agreement with Grupo Jaragua, a private conservation organization, to implement a management plan for the Park. The Nature Conservancy is also committed to developing and funding a training program for the Park.

Mbaracayú Forest Reserve, Paraguay

Located in eastern Paraguay, the Mbaracayú is one of the largest tracts of privately owned subtropical forest left in the Americas. Its 143,000 acres include dense rainforests, natural grasslands, peat bogs, rivers, and caves. The Bertoni Foundation, the Conservancy's local partner, will manage the property and protect it against encroaching development that threatens this last refuge of many species of flowering plants and fruits. It is also home to many other species either extinct or endangered in other areas, including jaguar, tapir, giant river otter, maned wolf, and birds like the king vulture and bare-throated bell bird. The Mbaracayú is the traditional hunting grounds of the indigenous Aché community, which will participate in its conservation.

Pacaya-Samiria National Reserve, Peru

In the heart of the lowlands of the Peruvian Amazon, the Pacaya-Samiria National Reserve offers one of the best opportunities to implement a large-scale conservation effort in the Amazon rainforest. At more than five million acres, the Reserve protects not only rainforest, but an expansive network of rivers, streams, marshes, oxbow lakes, and swamp forests. These diverse habitats shelter a number of endangered species, including gray and pink river dolphins, manatees, and spectacled caimans. Uncontrolled hunting, fishing, and slash-and-burn cultivation severely threaten the Reserve. The Conservancy is working with the Peruvian Foundation for the Conservation of Nature (FPCN) to strengthen efforts to protect the park and to improve the sustainable use of natural resources for the benefit of the local residents.

Ría Lagartos/ Ría Celestún, Mexico

Along the northern coast of Mexico's Yucatan Peninsula stand two biologically linked reserves, Ría Lagartos and Ría Celestún. Together, they encompass 264,000 acres of mangrove swamps, seasonally flooded marshland, and tropical forest, vital habitat for migratory and local waterfowl. The greater flamingo, for example, depends on Ría Lagartos for the salinity of its waters during the nesting season, and Ría Celestún for its fresh water during the wintering months. But these exotic birds aren't the only living things that depend on a healthy ecosystem. The enormous seafood industries of the Gulf of Mexico count on these coastal waters as spawning grounds for the fish and shrimp whose capture and processing employs thousands of people and feeds millions. The Nature Conservancy, with its local conservation partner Pronatura Yucatán, is working to ensure the careful management of these important resources by encouraging public education and outreach programs and exploring long-term strategies for tourism and industry.

Rio Bravo Conservation and Management Area, Belize

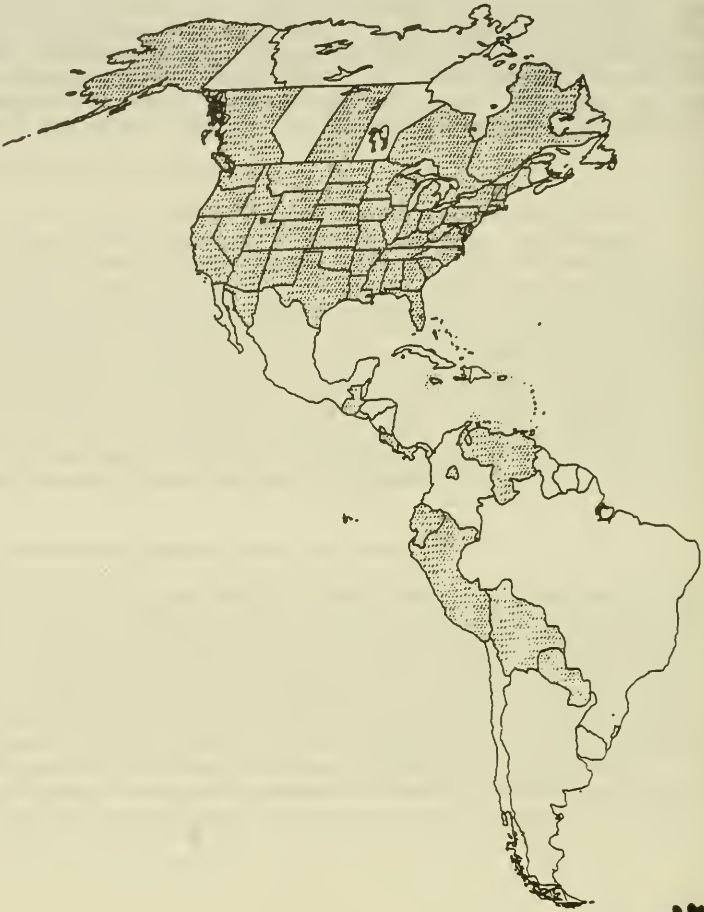
Near the junction of three nations - Mexico, Guatemala, and Belize - lies the 207,000 acre Rio Bravo Conservation and Management area. Its dense forests of mahogany and cohune palm provide a refuge for some of Central America's most endangered species, including black howler monkeys, tapirs, margays, and jaguar. Over 300 species of birds have been identified, among them toucans, great curassow, and dozens of North American songbirds that migrate to the region for the winter. Archaeological treasures also abound in the area. Rio Bravo was once occupied by ancient Mayans, revealed by a number of Maya ruins in the Conservation area itself. The Nature Conservancy is working with its local partner, Programme for Belize, to make Rio Bravo a nature tourism and technical training site, as well as a center for ecological research, forest management, and archaeology.

Talamanca Caribbean Corridor, Costa Rica

Few nations can match Costa Rica's dense concentration of biodiversity, and nowhere is this biological wealth richer than in its southern corner - the canton (county) of Talamanca. Within the 3,000-square kilometer canton, the elevation ranges from sea level to 12,533 feet. A transect from the highest peak, Mt. Chirripo, to the Caribbean encompassed nine of the twelve life zones found in Costa Rica. In addition, Costa Rica's only coral reef lies off the coast of Talamanca. Much of Talamanca is included in La Amistad Biosphere Reserve. Home to more than 560 species of birds, 215 mammals, and 250 amphibians and reptiles, Talamanca and its rare species can best be preserved by extending a corridor of protected forest from the Continental Divide to the sea. The Nature Conservancy will work with the Costa Rican government and local conservation organizations to accomplish this goal through a combination of land purchases, conservation easements, and eco-development projects.

Perspectives on Species Imperilment:

A Report from the Natural Heritage Data Center Network



The Nature Conservancy.

April 1, 1993

The Network of State Natural Heritage Data Centers
contains the most comprehensive and accurate
compilation of rare species information that exists for the United States.

Acknowledgements

The findings presented here draw primarily on 24,573 occurrence records of federally listed species, developed and maintained over the past two decades by the Natural Heritage Data Center Network in cooperation with The Nature Conservancy. Special thanks are due to the staffs of the fifty U.S. State Heritage Data Centers, and the Navajo Nation Heritage Program, for their prompt and thorough response to the detailed data request upon which the present report is based. Refer to the last section of this report for a brief description of the Natural Heritage Network and a list of individual Natural Heritage Data Centers.

Data analysis and interpretation, as well as report production, were conducted by the Science Division of The Nature Conservancy under Robert Jenkins, Vice President, Director of Science Programs.

The Project Coordinator was Richard Warner. Scientific analysis and data interpretation were conducted by: Virginia Crouch, Shara Howie, Lynn Kutner, Ellen Kwiatkowski, Kathy Lemon, Larry Master, Melissa Morrison, Larry Morse, Christa Russell, Leslie Seiger, Lesley Sneddon, Carolyn Thurman and Leni Wilsmann. Many of these individuals also assisted in the writing and editing of the report.

The maps and illustrations presented here are by Christina Erickson, Amy Melton, Melissa Morrison, Sherry Pittam, Megan Rollins and Josephine Toms. Base maps were developed by Ineke Dickman.

Production of the report was directed by Brandy Clymire, with assistance from Hilary Toma and Ron Leonard.

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Summarized information on the status of Federally listed threatened and endangered species on Federal lands in the United States.

Submitted to the Subcommittee on Environment and Natural Resorces of the House Merchant Marine and Fisheries Committee by The Nature Conservancy in cooperation with the network of State Natural Heritage Data Centers.

April 1, 1993

Introduction

In response to a request from Committee staff, the State Natural Heritage Data Centers have compiled and submitted information from their databases about the status of Federally listed plant, vertebrate, and invertebrate species[1] on Federal lands. All fifty State Data Centers and the Navajo Nation Data Center responded to the request. This information was combined with rangewide data from the Natural Heritage Network's Central Scientific Database to produce this report. The data were cross-checked with a special national database on endangered and sensitive plant species that the Conservancy shares with the U.S. Forest Service, with information coming from both Heritage Data Centers and the Forest Service regional and National Forest offices.

Sclerocactus mesae-verdae occurs in the Four Corners region with sites on lands of the Navajo Nation and Ute Mountain Utes.

The Network of State Natural Heritage Data Centers contains the most comprehensive and accurate compilation of rare species information that exists for the United States. Beginning nearly 20 years ago, Heritage Programs have been continuously gathering and organizing information that is used for conservation and development planning in the public and private sectors. This information has played a key role in state and federal endangered species listing and delisting actions, as well as in identifying priority ecosystems for protection through federal, private, and joint conservation programs.

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[1] "Species" under the Endangered Species Act include subspecies as well as full species; in the strict taxonomic sense these would be collectively referred to as "taxa."

The Heritage databases are not, of course, complete. Some information known by others has yet to be reported to them and new discoveries are made continuously. Many government and private land areas are still under-surveyed, and even on well-surveyed lands, previously unrecorded species continue to turn up, either because of recent colonization or prior lack of detection.

At the same time, some known populations are extirpated by habitat destruction, direct exploitation, or natural causes. For these reasons the Heritage databases are permanently operating and continuously revised to reflect current knowledge and reality. Many threatened, endangered, and candidate species are so extremely rare and vulnerable that the loss of a population or the discovery of previously unknown ones are crucial factors to their continued existence.

Since habitat destruction continues apace and the status of many species is still not well known, it is very important to continue and to expand coordinated field inventory efforts and the compilation, management, and utilization of the information generated from them.

Methods

In order to assess the status of federally listed endangered or threatened plant and animal species on Federal lands, we asked the 50 state Natural Heritage Programs and the Navajo Nation Natural Heritage Program to provide specified summaries of the information in their databases. All 51 programs responded to the request.

For each listed species in their jurisdiction, the data centers were asked to report the managing agency owner type for all occurrences observed since 1973. Nearly all of the data centers use the Conservancy-developed Biological and Conservation Data (BCD) System to maintain their information. For these BCD-based data centers, we provided a set of computer programs that produced the requested reports. The few states using other data systems were asked to perform comparable searches and tallies. In most cases, the data-center staff provided additional information not yet entered into their computers. This data-assembly strategy was generally successful because all the Natural Heritage Data Centers employ the same basic methodology for recording and maintaining their information.

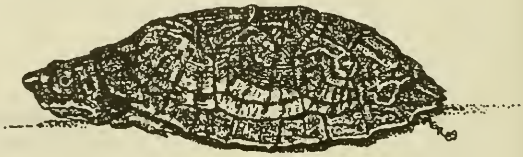
A few states were unable to provide complete responses in time for the present analysis. (Most of this missing information has now been received, and will be incorporated into future analyses.) Data for Iowa and eastern Pennsylvania were incomplete, but involved few federal lands. Only plant data were available from South Carolina and Washington, and California could not immediately provide data on listed threatened animal species. Species occurrences in Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, and the District of Columbia are not addressed in the present study.

Minor inconsistencies in the data arise whenever an individual occurrence (population, etc.) of a species ranges over lands of two or more agencies. Such occurrences are here recorded once for each agency. While this method captured the maximum possible involvement of the federal agencies, it slightly over-counts the number of occurrences. Also, a few species occurrences last verified prior to 1973 were included in data provided by some of the states. Where detected, these were removed, although it is possible that some remain in our national data set.

The Heritage Network's Central Scientific Databases, maintained by the Conservancy's Science Division, were used in various ways to check and add to the data provided by the Natural Heritage Data Centers. These databases include centrally developed species tracking databases containing overview information for each species such as scientific and common names, federal status and *Federal Register* date, Conservancy/Heritage imperilment rank, and a list of states from which the species is reported.

The state-level data in these central databases are maintained primarily through periodic data exchanges with the state data centers, which provide state ranks, protection statuses, and other state-level information. Differences in taxonomic treatments among the states are

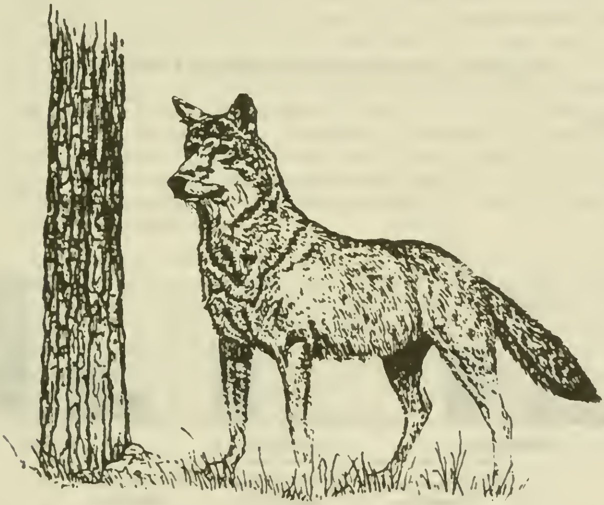
Flattened Musk-Turtle



resolved in the central databases through use of standard taxonomic classifications, such as the *Synonymized Checklist* of U.S. and Canadian vascular plants by John Kartesz of the North Carolina Botanical Garden.

The combined results provided a data set on about 24,573 occurrences of listed species for nearly 728 taxa. These data from the state Natural Heritage Data Centers were consolidated to create the national data set used in analysis for this report. Scientific staff of The Nature Conservancy reviewed the data to assure data quality and consistency. Information on numerous species was checked against the central databases, scientific literature, and expert knowledge. Heritage staff were contacted for clarification or additional information as needed. Also, information on plant species of National Forests, including designations of Sensitive Species status, were obtained from a database developed jointly by the Conservancy and the USDA Forest Service.

Species and occurrences found on lands and water owned or managed by federal agencies are not all recorded in our data set for four major reasons: (1) the Natural Heritage Data Centers may not yet be aware of all occurrences, (2) nearly all programs have a data-entry backlog, (3) not all data centers have completely recorded the land ownerships for all their occurrence records, and (4) species and species occurrences in lakes and rivers are generally not recorded by the data centers as under the jurisdiction of a federal agency except where they are entirely included in such areas as National Parks or Wildlife Refuges.



The red wolf exists in the wild only as reintroduced populations.

Listed Species and Federal Lands

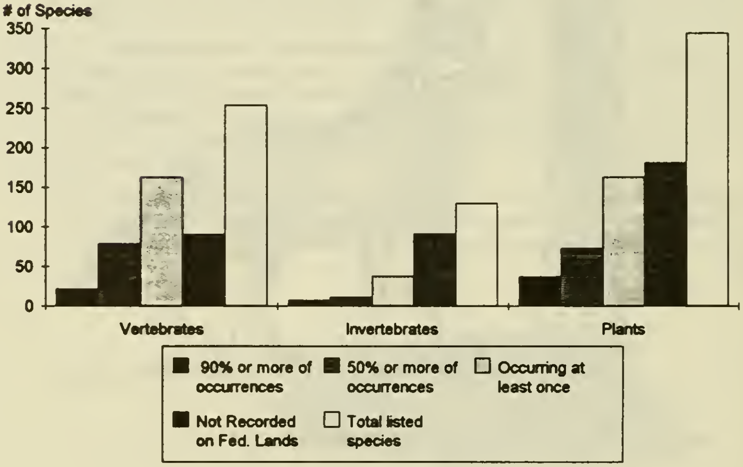
How many listed T & E Species occur on Federal lands?

This report covers the 728 species of vascular plants, vertebrate animals, and invertebrates that are listed as Endangered or Threatened under the Federal Endangered Species Act which are found in the 50 U.S. states—344 plants, 254 vertebrates, and 130 invertebrates.

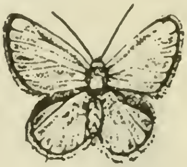
Approximately 50% of all federally threatened and endangered species occur at least once on Federal lands (Figure 1). Of those, almost a quarter are found nearly exclusively there, with 90-100% of their occurrences restricted to Federal land. This small but significant number of currently listed species of vertebrates, invertebrates, and plants are virtually the sole responsibility of Federal management agencies. Examples include the plant Ruth's golden aster (*Pityopsis ruthii*) with 6 occurrences all on one National Forest, and rhizome fleabane (*Erigeron rhizomatus*) with nearly forty occurrences, of which one is on BLM land and the rest are on the National Forests. Animals found exclusively on Federal lands include the Laysan duck (*Anas laysanensis*) and the red wolf (*Canis rufus*), both of which currently exist only on National Wildlife Refuges.

Federal agencies can provide for substantial, permanent conservation of the listed species with more than half of all occurrences on their lands. This represents nearly one-half of the listed species on Federal lands. These species can significantly benefit from Federal land management protection and recovery actions. For example, both white-haired goldenrod (*Solidago albopilosa*) and white birds-in-a-nest (*Macbridea alba*) have their majority representation on National Forest lands.

Figure 1. Listed Species Occurring on Federal Lands



For the many listed species with less than 50% of their occurrences on Federal land, Federal agencies can provide at least some conservation benefits by management actions on lands they currently administer.



For some species, like the Karner blue butterfly (*Lycaeides melissa samuelis*) with less than one-quarter of its occurrences on Federal land, the large landscape context and single ownership of Federal lands provide important recovery opportunities. Restoration and management of its pine and oak savanna habitat will also benefit many associated rare plant and animal species.

In other instances, although the Federal agency should do all it can for whatever populations exist on its property, successful conservation will depend primarily on others. Examples would include *Scutellaria montana*, the large-flowered skullcap, and *Etheostoma rubrum*, the bayou darter. The former has a single occurrence on a National Forest and a dozen on state and private lands. The latter has one occurrence on a National Park and over thirty on private ownerships.

Extent of Federal Management Responsibility for Listed Species

The U.S. Forest Service, with management responsibility for nearly 150 species, has the greatest known diversity of federally listed plant and animal species on its property of any Federal agency (Figures 2–5). The other major agencies have nearly 100 species each. The preponderance of species on Forest Service lands reflects not only the size and geographic extent of the landholdings, but also the intensive surveys that have been conducted on many National Forests. Since some species occur on more than one agency's land, the numbers in Figures 2–5 are different from those in Figure 1. For example, the Everglade kite *(Rostrhamus sociabilis plumbeus)*, is found on both National Forest and National Park lands, and the bald eagle (*Haliaeetus leucocephalus*), has occurrences on the lands of every major agency. The heliotrope milkvetch (*Astragalus montii)*, on the other hand, has only 3 occurrences, all on one National Forest. The Devil's Hole pupfish *(Cyprinodon diabolis)*, exists in a single limestone pool in a National Monument, and the Magazine Mountain shagreen snail (*Mesodon magazinensis*) has a single occurrence on a National Forest (if it still exists at all).

With only about one-half of the federally listed species occurring on Federal land, the potential effect of Federal agencies on the protection and recovery of federally listed species is underestimated if land ownership is the sole criterion examined. Protection of multiple species in an ecosystem can be accomplished by protecting their habitat through minimizing impacts on air and water quality affecting wetlands, lakes and streams, navigable waterways, and coastlines. When combined with acquisition, recovery, and management partnerships with state and local agencies and private conservation organizations, the benefit to biological diversity extends far beyond federal landholdings.

Listed Species Occurring by Jurisdiction on Federal Lands

Figure 2. All Species

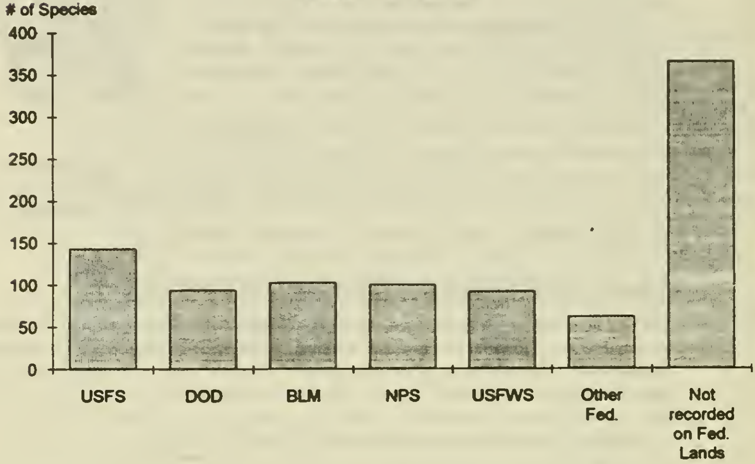
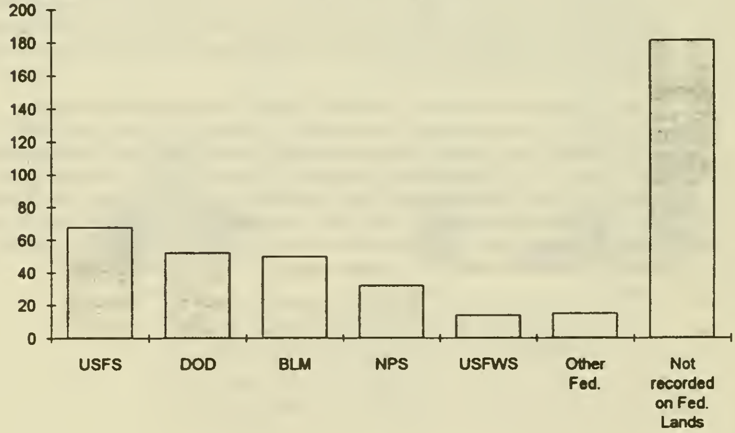


Figure 3. Plants



Listed Species Occurring by Jurisdiction on Federal Lands

Figure 4. Invertebrates

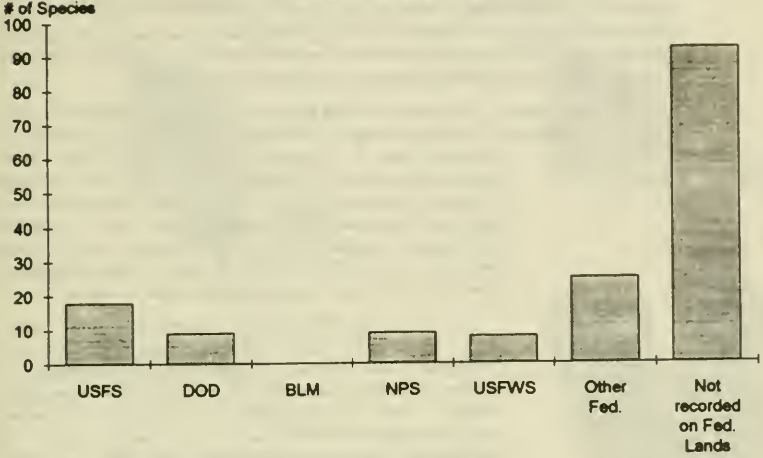
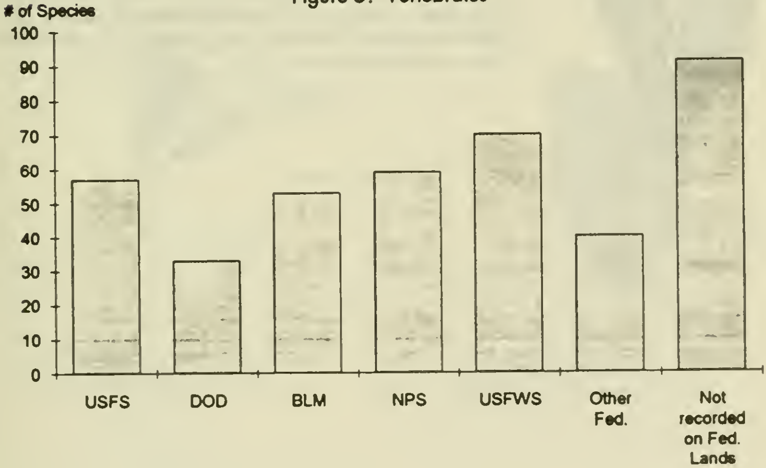


Figure 5. Vertebrates



Occurrences of Listed Species on Agency Lands

The opportunity for significant recovery actions on Federal land is reflected by the large proportion (over one-third) of the occurrences of federally listed species which are on agency lands (Figures 6 -9). These figures also indicate that this is a big job, made even bigger by the need to coordinate with protection actions on surrounding lands to accomplish ecologically significant ecosystem protection. If candidate species were included, many of which are just as imperiled as the listed species, the job would be shown to be many times greater.

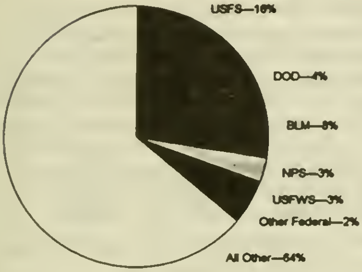
The average number of occurrences per listed species varies markedly among plants, vertebrates and invertebrates. There is an average of 34 occurrences per species for all species combined (Figure 6), 17 occurrences per plant species (Figure 7), 67 occurrences per vertebrate species (Figure 9), and 13 occurrences per species for invertebrates (Figure 8). However, the diffuse distribution of some vertebrates heavily influences these figures. If the 12 vertebrates with the greatest number of occurrences are removed from the calculations (12,121 occurrences or 49% of the original total for all species), the vertebrate average drops to 20 and the overall average to 17.

The reason for the diffuse occurrence pattern among many vertebrates, such as the bald eagle (*Haliaeetus leucocephalus*) and red-cockaded woodpecker (*Picoides borealis*), is that each occurrence or locality contains only a pair or sometimes a single individual, whereas occurrences for plants and most invertebrates tend to denote the presence of entire local populations (which may be large or small, of course). The diffuse pattern may also make these species more difficult and expensive to adequately conserve, although many other variables may be important. Species occupying aquatic habitats, for example, pose special difficulties regardless of taxonomic group, since they are vulnerable to impacts on entire watersheds.

Red-Cockaded Woodpecker

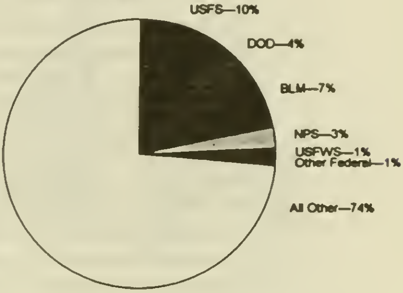
Occurrences of Listed Species by Land Ownership Category

Figure 6. All Species



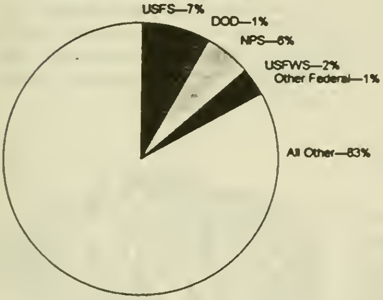
Total # of Species—728
Total # of Occurrences—24,573

Figure 7. Plants



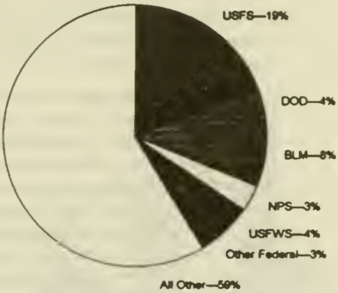
Total # of Species—344
Total # of Occurrences—5,769

Figure 8. Invertebrates



Total # of Species—130
Total # of Occurrences—1,690

Figure 9. Vertebrates



Total # of Species—254
Total # of Occurrences—17,114

Getting Ahead of the Extinction Curve

Establishing Conservation Priorities

Through the following examination of the status of selected animal groups, we are going beyond the Federal land aspects of endangered species management to identify commonalities in species' imperilment status, threats, and conservation needs.

The Natural Heritage Network has established a ranking system to reflect the biological imperilment status of each species on a state (S-rank), national (N-rank), and range-wide or global (G-rank) basis. Using information compiled by the various Natural Heritage Data Centers, each species is subjected to a formal ranking procedure that evaluates its abundance, distribution, and fragility, as well as the threats it faces. Each rank ranges from 1 to 5, representing a status of critically imperiled to demonstrably secure. Special ranks are assigned for extinct or extirpated (X) and historic (H), the latter meaning that there are no known current occurrences but we haven't given up hope and are still surveying for the species in the field. In general, species with a rank of G1–G3 are biologically qualified for listing as endangered or threatened, subject to additional questions about degrees of threat.

Species with G-ranks of 1 (G1), are critically imperiled throughout their range and typically have fewer than 6 occurrences in the world, or fewer than 1,000 individuals.

Species with G-ranks of 2 (G2), are imperiled throughout their range and typically have between 6 and 20 occurrences, or fewer than 3,000 individuals.

Species with G-ranks of 3 (G3), are vulnerable throughout their range and typically have fewer than 100 occurrences, or fewer than 10,000 individuals.

The global rank patterns among animal groups (Figures 10–12) highlight the degraded condition of many aquatic ecosystems in the U.S. By comparing the G-ranks of aquatic groups (amphibians, fishes, crayfishes, and unionid mussels) with those of the more terrestrial groups (mammals, birds, and reptiles), the disproportionate numbers of aquatic taxa in peril are striking. Over 760 aquatic species (44%) are ranked GX, GH, or G1–3 as compared to the 203 terrestrial species (13%) in the same categories. This is because aquatic systems are vulnerable to the effects of pollution, impoundment, water appropriation, and watershed abuse. Federal agencies have jurisdiction and a high degree of responsibility in this area.

A disparity exists between the percentage of federally listed species in each taxonomic group and the number of rare or declining taxa as determined by G-ranks (Figure 11). It is especially noticeable among the invertebrate groups (crayfishes and mussels), where listing has lagged well behind our consciousness of their imperilment. Not only have the species been hurt by this, but so have the aquatic ecosystems that constitute their habitat—ecosystems with many economic and social values which are diminished by the same forces which are destroying the organisms.

Cladonia perforata

Figure 10. Status of Selected North American Animal Groups

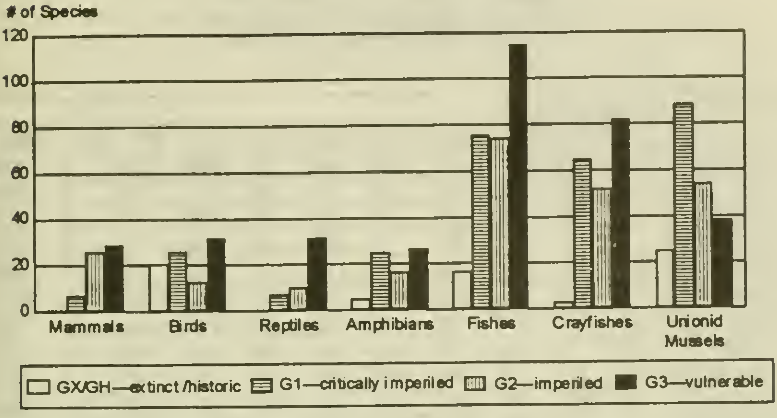


Figure 11. Aquatic Ecosystems: Pre-listing management priorities

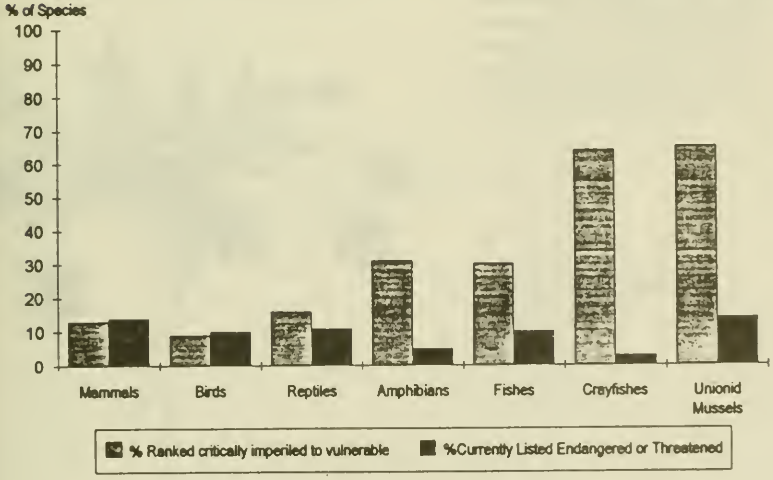


Figure 12. Status of U.S. Animal Species
Natural Heritage Network Central Databases
The Nature Conservancy 3/93

No. of Species Ranked (U.S.)									
	GX	GH	G1	G2	G3	G4	G5	G?	Misc.	Total
Mammals*	1	0	7	26	28	89	280	22	0	453
Birds*	18	3	26	13	32	83	617	33	0	825
Reptiles*	0	0	7	10	32	47	208	7	0	311
Amphibians*	3	2	25	17	27	42	114	2	0	232
Freshwater Fishes*•	17	0	76	74	115	135	403	71	2	893
Vertebrate Total*	39	5	141	140	234	396	1622	135	2	2714
Butterflies	1	2	6	9	42	93	319	302	15	789
Crayfish*	1	2	65	52	82	55	52	3	2	314
Unionid Mollusks*	11	14	89	54	38	37	37	19	1	300
Other Invert.	20	178	485	404	193	540	901	3032	135	5888
Invertebrate Total	33	196	645	519	355	725	1309	3356	153	7291
Total Full Species	72	201	786	659	589	1121	2931	3491	155	10005

An (*) indicates that all full species in that group have ranks and the total (far right column) is the number of full species in the U.S.

•Includes certain estuarine fishes.

Management Options for Candidates and other Rare Species

Of approximately 2,400 plant species ranked G1 and G2, one third have never been formally considered for federal listing; the same is true for half of the 5,000 native U.S. plant species ranked G1 through G3. With appropriate planning and management, many of these rarities can be conserved with no need for formal listing, greatly reducing the likelihood of future legal and economic conflicts.

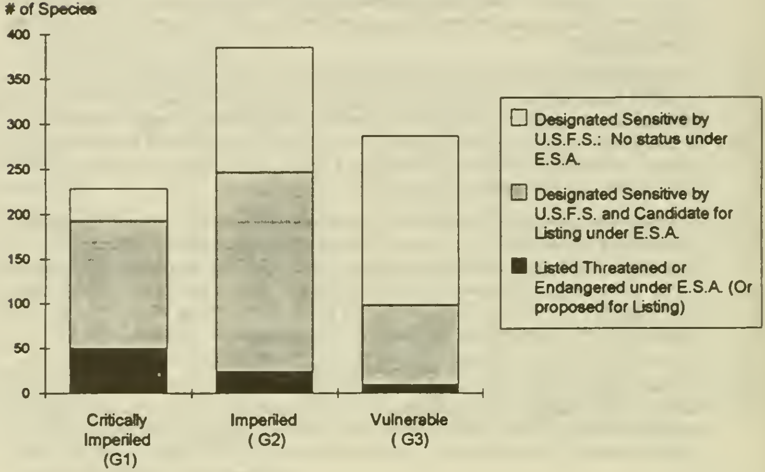
A good example of a land-managing agency taking action to stay ahead of the listing curve is the USDA Forest Service's Sensitive Species Program. Each Regional Forester has the authority to designate taxa as "sensitive" and directs the National Forests in his or her region to evaluate projects to ensure that Forest Service actions do not contribute to the loss of viability for these species. The Sensitive Species Program manages a large number of species not currently listed under the Endangered Species Act (Figure 13).

Sensitive species are typically identified in consultation with the State Natural Heritage Data Centers. On a national level, information on threatened, endangered and sensitive species occurring on Forest Service lands is derived from a shared database maintained under a cooperative agreement between The Nature Conservancy and the USDA Forest Service. Habitat conservation assessments are prepared for sensitive taxa and the Forest Service works with the Fish and Wildlife Service's Pre-listing Recovery Program to plan conservation strategies.

Over 70% of the Forest Service's sensitive species are plants, many of which are rare partly because they depend on a restricted habitat. Lassics lupine (*Lupinus constancei*) for example, is ranked G1 because it has very few occurrences and is endemic to a small area. It occurs only on serpentine substrates in the Lassics mountains area, on one Ranger District of the Six Rivers National Forest in northern California. Although not listed, Lassics lupine has been designated Sensitive by the Forest Service's Pacific Southwest Region. The Forest recently closed a road and is designating a special botanical area to conserve the habitat of this and several other sensitive species found on Lassics serpentine.

lassics lupine, *lupinus constancei*

Figure 13. Globally Rare and Imperiled Plant Taxa Managed for Conservation on US. Forest Service Lands



Case Studies

Mid-Atlantic Serpentine Barren

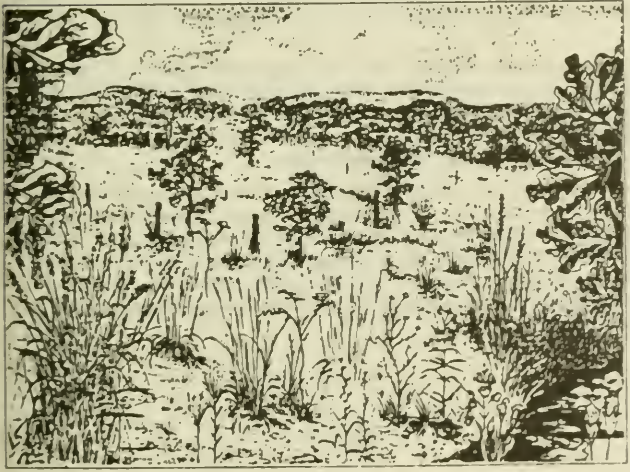
Description

The serpentine barren is a grassland or savanna that grows on a nutrient-poor soil called serpentine. Early settlers and farmers referred to these essentially treeless areas as "The Barrens" because their attempts to cultivate them met with little success. Serpentine soil and the bedrock it is derived from are highly unusual because they contain very low amounts of nutrients and high amounts of heavy metals. The bare rock and thin soils also foster very high summertime temperatures in the soil. Only plants that can tolerate these severe conditions persist in serpentine barrens, so the resulting vegetation is an unusual combination of scattered stunted trees, grasses, and herbs, many of which are rare. The term "serpentine" refers to the greenish color of the bedrock, which somewhat resembles the color and pattern of a snake's skin.

From the air, serpentine barrens resemble islands. Their boundaries are abrupt and obvious because the vegetation reflects a profound difference in the underlying bedrock. They usually have many rock outcrops, and their soils are notably thinner than those adjacent. Common grasses of serpentine barrens include little bluestem and prairie dropseed, and the few trees that do grow there are generally a mixture of pines and oaks. Other species commonly found on Mid-Atlantic serpentine barrens include whorled milkweed, green milkweed, creeping phlox, and slender knotweed.

Habitat and ecology

The harsh growing conditions effectively exclude many plant species from growing in serpentine barrens, though occasional hardy trees from the surrounding land can become established These invading trees provide shade and small cool areas within the barrens, paving the way for other plants, less tolerant of the harsh conditions, to invade. Serpentine barrens would become overrun with plants from the surrounding landscape were it not for periodic



Serpentine grasslands after a prescribed burn, a diverse mosaic of prairie grasses and flowering herbs.

fires that sweep through and remove the occasional invaders. For thousands of years, naturally occurring fires and those set by Native Americans held invasive species in check while the serpentine vegetation recovered quickly after fires passed through.

Historic range and current distribution

Though there are many types of serpentine barrens across the United States and Canada, the rare type described here is restricted to the piedmont of the eastern United States and to several small areas on Staten Island, New York. More than 90% of the acreage of Mid-Atlantic Serpentine Barrens occurs in Chester and Lancaster Counties in Pennsylvania and Cecil County, Maryland (see map).

While the absolute range of this community has not changed much over time, the amount of acreage has declined since the time of European settlement. Many sites of substantial size historically have been reduced to just a few acres. Only a few good to excellent quality sites remain today.

Reasons for decline

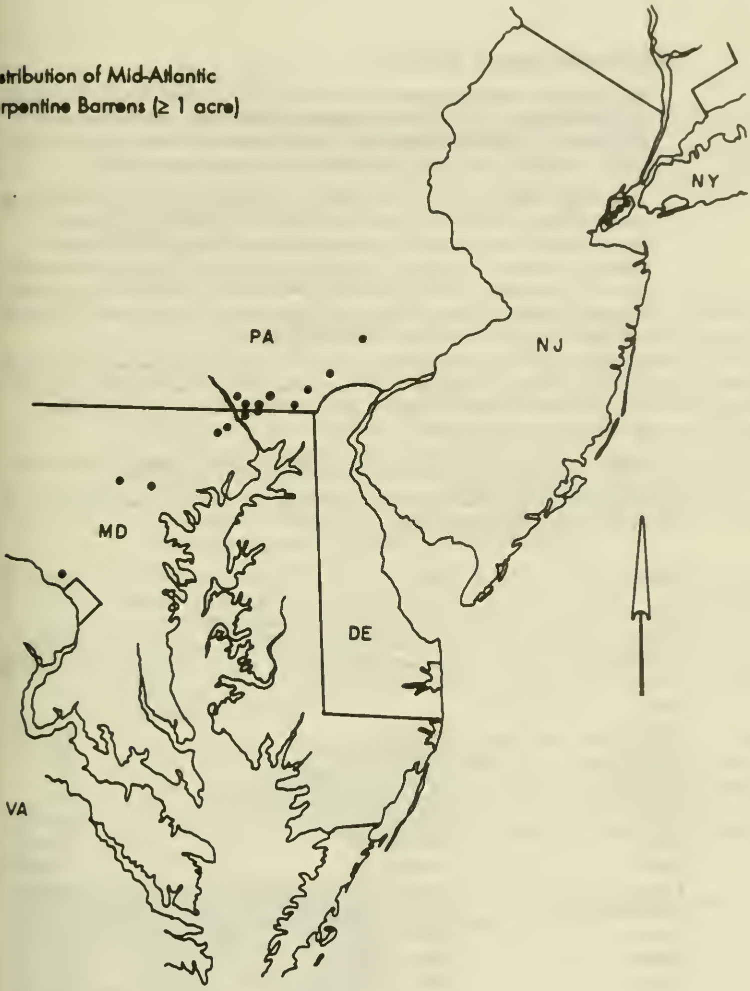
The poor soils of serpentine barrens generally protected them from agricultural practices, however, they have not been spared from the degradation of a host of other human activities. The barrens of Maryland and Pennsylvania were a major center of chromium mining in the nineteenth century, and there is today a very large active stone quarry at one site in Pennsylvania. More than a dozen small sites in Pennsylvania and Delaware have been impacted if not destroyed by housing developments, golf courses, and other intensive land use. Even the largest existing barrens have been reduced in size by land-development activities.

Gypsy moth spraying is another threat to the animal component of these serpentine barrens communities. Leaf-feeding moths and butterflies, which include many rare species, are particularly vulnerable. Since barrens are typically isolated from each other, recolonization happens only rarely.

A more indirect, but equally harmful impact is the establishment of plant species introduced to the region from other areas. Tree-of-heaven, field garlic, sweet vernal grass, Queen Anne's lace, and cypress spurge are just a few of the alien weeds posing a threat to the natural community composition of serpentine barrens. Perhaps the greatest of these threats is black locust, which has invaded several barrens and is spreading rapidly.

Another cause of the decline of serpentine barrens has been the suppression of periodic fires that remove the invading trees and other plants that become established from the surrounding vegetation. Comparisons of historic and modern aerial photographs at several large barrens reveal that a substantial decline of prairie and grassland has occurred over the past 50 years, coincident with the adoption of active fire suppression. The naturally open grassland and woodland has been encroached upon by fire-intolerant tree species such as scrub pine and red cedar.

Distribution of Mid-Atlantic
Serpentine Barrens (≥ 1 acre)



State by state summary (Table 1)

New York—Four sites ranging from two to ten acres exist on Staten Island. Three are in municipal ownership, and all have been significantly degraded. The tree species commonly associated with this community are no longer present. No rare species currently exist on these sites, nor is there evidence that they ever occurred historically.

Pennsylvania—Eight sites greater than two acres in size remain. Nearly a dozen sites in the western suburbs of Philadelphia have been fragmented, degraded, or destroyed by incompatible land use. One of the major sites is currently being eroded by a stone quarry, and another is imminently threatened by construction. Three sites are currently in partial or total public ownership (county or state park, or land trust). Eastern serpentine aster, *Aster depauperatus*, a federal candidate for listing (C2), occurs on all of the sites and two other candidate plants are found on one site.

Maryland—Seven sites of at least one acre exist. Two are in public ownership; the largest is primarily owned and managed by the state. One site is threatened by a stone quarry. Five of these sites contain rare species. One site contains the federally endangered sandplain gerardia, *Agalinis acuta*.

Delaware—One historical site has been destroyed and no other examples of serpentine barrens remain in the state.

Table 1. Serpentine Barren Sites

Owner	Sites	Quality
State		
State	Goat Hill, PA (Shared w/MD)	Excellent
State/Private	Soldiers Delight, MD	Excellent/good
Other		
Municipal	Seaview, NY	Good/fair
Municipal	Heyerdahl Hill, NY	Fair
Unknown	Grymes Hill Serpentine, NY	Fair
Municipal	Wagner High School Meadow, NY	Fair
County	Nottingham Park, PA	Excellent
Private	New Texas, PA	Excellent
Private	Unionville, PA	Good/fair
Private	Rock Springs, PA	Good
Private/Municipal	Chrome Barrens, PA	Good
Private	Fern Hill, PA	Fair
Private	Sugartown, PA	Fair
Private	Pilot Serpentine Barren, MD	Good
Municipal	Robert E. Lee, MD	Good?
Private	Haborim Dror Camp Moshava, MD	Good?
Private	Goat Hill, MD (shared w' PA)	Fair
Private	Bald Hill, MD	Fair
Private	Big Pines Serpentine Barren, MD	Unknown

Management needs

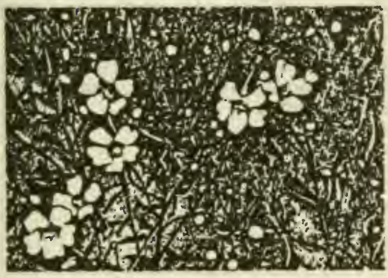
Direct impacts by land development activities must be reduced. The long-term viability of serpentine barrens depends on a program of prescribed burning to sustain a mosaic of successional stages and to restore grassland and woodland vegetation to areas within or on the margins of barrens that have been encroached upon by fire-intolerant trees. Exotic species that are not controlled through prescribed burns must be eliminated through other means, wherever possible.

Benefits of the Endangered Species Act

The serpentine barrens offer an excellent opportunity to protect a diversity of rare species through habitat management. The sandplain gerardia, *Agalinis acuta*, is federally listed as endangered and is found only at one Maryland serpentine barren site and fewer than ten non-serpentine sites in the northeast. One candidate (C2) species, eastern serpentine aster, *Aster depauperatus*, is found exclusively on serpentine barrens. Purple spurge, *Euphorbia purpurea*, and a leafhopper species so new to science that it lacks a species name, *Limotettix* sp. 1 are candidate (C2) species that are also found on serpentine barrens. Other even more imperilled species found on serpentine barrens have no official status under federal listing process. Examples included Torrey's mountainmint, *Pycanthemum torrei*, which has a Natural Heritage rank of G2, and a critically imperilled species of moss, *Bryum reedii*, which has a Natural Heritage rank of G1. This moss is believed to occur at five or fewer places on earth.

In addition to federally listed species, serpentine barrens harbor species that are listed as endangered or threatened under state authority. For example, the Soldiers Delight serpentine barren in Maryland harbors 18 state listed endangered and 4 state listed threatened plant and animal species. In fact, 3 species which occurred at the Soldiers Delight site historically are now extirpated from Maryland altogether. Two of these species are believed to be extirpated from Maryland because the majority of grassland ecosystems (including serpentine barrens) have disappeared from the state.

Although the Mid-Atlantic serpentine barren is an extremely rare ecosystem that harbors many rare species, it is not currently afforded protection under the current endangered species act. Loss of habitat such as this is the overwhelming cause of the decline for many species Preserving entire ecosystems such as the serpentine barrens would not only afford protection to federally listed species, but would also prevent other species from declining to the point where they must be listed.



Sandplain Gerardia, *Agalinis acuta*, Federally listed as Endangered

Seabeach Amaranth (G2)

(Amaranthus pumilus)

Federal Status: Proposed for listing as a Threatened Species, Federal Register, May 26, 1992

Description

The seabeach amaranth is a low-growing, leafy herbaceous plant currently known from about 40 less-developed beach areas in the Carolinas and on Long Island, New York. Confined to open sand along the ocean shore, this relative of the cultivated amaranths forms rounded, branched clumps a foot or more in diameter. Its fleshy, bright pink or red stems bear inconspicuous flowers and fruits.

Habitat and ecology

With its deep green leaves, seabeach amaranth stands out in the open vegetation of coastal beaches and overwash flats, growing beyond the daily high-tide mark in areas affected by hurricanes and other major storms. Seeds of the this amaranth can survive many years buried in the sand, then germinate when brought near the surface by severe storms.

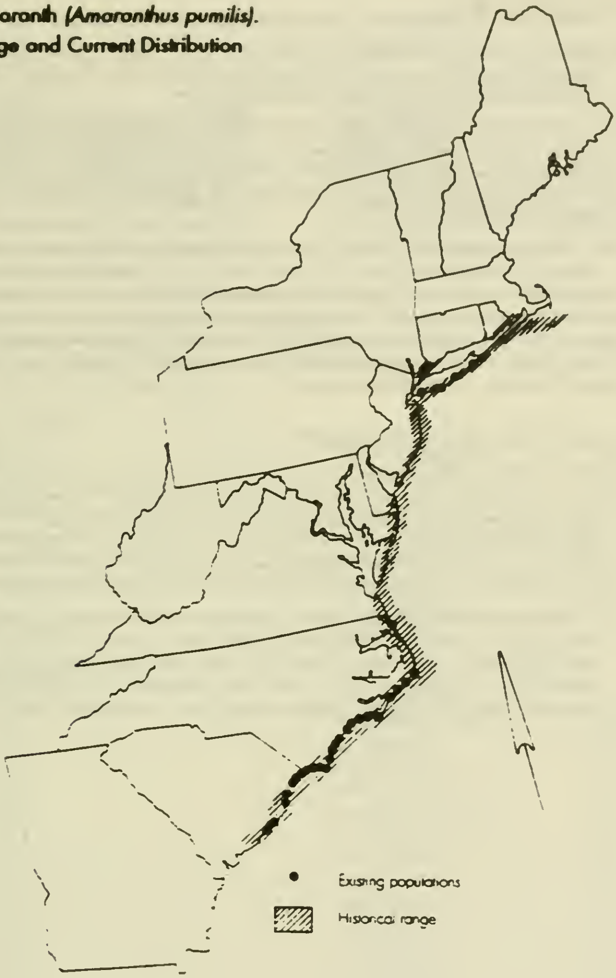
The ecosystem in which seabeach amaranth occurs is also essential to numerous other plant and animal species of the ocean shore. Two federally listed birds, the piping plover and the least tern, regularly nest in these back-dune sandflats throughout the range of the amaranth. In the Carolinas, the federally listed loggerhead sea turtle also uses amaranth beaches for nesting. Management of back-beach areas for these rare birds and turtles also helps amaranth plants by restricting or prohibiting foot and vehicular traffic through the nesting areas during the plants' growing season.

Historical range and current distribution

Seabeach amaranth formerly ranged along beaches of the Atlantic Coast irregularly from Kiawah Island, South Carolina, north to Nantucket, Massachusetts. Old museum specimens show it once inhabited many of the very places which have become major East Coast beach resorts, such as Coney Island and Atlantic City. The species no longer occurs in about half of the places it was once found (see map), and seems to be gone altogether from Massachusetts, Rhode Island, New Jersey, Delaware, Maryland, and Virginia.

North Carolina is this species' present stronghold, with about two dozen populations. In South Carolina, seabeach amaranth is currently known from about a dozen populations, and in New York State it has about five populations on Long Island.

Seabeach Amaranth (*Amaranthus pumilis*). Historical Range and Current Distribution



Reasons for decline

Intolerant of competition, seabeach amaranth plants are not found in dense vegetation. Instead, this is a 'survivalist' species, adapted to the sunlight, saltwater, and drifting sand of the ocean beach, a habitat in which few other plant species can grow.

Seawalls, jetties, breakwaters, and other structures have often been constructed in developed areas to protect roads and buildings near the water. The beaches in these places usually lack the sparsely vegetated back-beach habitat preferred by the seabeach amaranth. Other beach-stabilization techniques such as sand fences and beach-grass plantings are also generally detrimental to this plant.

Even in less developed areas, recreational use of Atlantic Coast beaches is often intense. Seabeach amaranth usually grows in the back-beach area, nearly at the dune line, while people congregate more often in the portions of the beach nearer the water. Therefore, amaranth conservation and recreational beach use need not be incompatible. Simple roping of amaranth habitat prevents unintentional trampling of the plants during their growing season. At other times, the moderate disturbance created by the occasional hiker or beach-buggy driver does no harm to the dormant seeds of the amaranth.

Land ownership and management

With its small, irregularly distributed populations, seabeach amaranth occurs on various federal, state, county, city, and private lands (see table). Of the species' twelve most important stands, eight include numerous parcels of private land, five include state or local-government lands, and only two (on Cape Hatteras National Seashore) involve federal lands. Several lower-quality stands occur on various other federal lands managed by the National Park Service, the U.S. Fish and Wildlife Service, and the Department of Defense's Camp Lejeune Marine Base.

The increased interest in recent years in applying an ecosystem approach to planning and management of Atlantic Coast beach areas should minimize future loss of seabeach amaranth habitat and prevent further decline of this plant and the other species found with it in these coastal habitats. Full recovery of these species will require interest and participation by numerous private beachfront landowners as well as federal, state, and local governments.

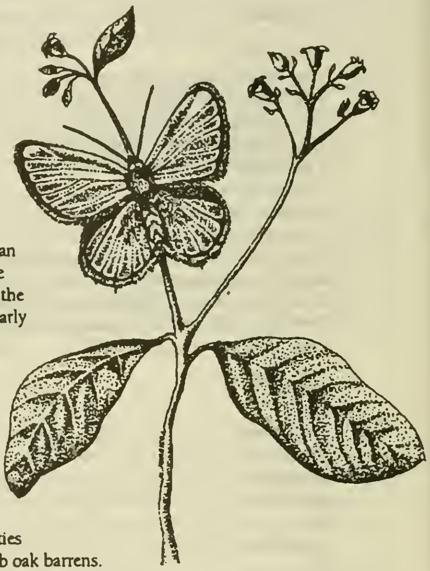
Land Ownership of Seabeach Amaranth Occurrences

Landowner	State and Area	Quality
Federal Lands		
Cape Hatteras National Seashore (NPS)	Cape Hatteras, NC	Excellent
Cape Hatteras National Seashore (NPS)	Ocracoke, NC	Excellent
Cape Lookout National Seashore (NPS)	Portsmouth, NC	Fair
Cape Lookout National Seashore (NPS)	Core Banks, NC	Fair
Cape Lookout National Seashore (NPS)	Shackleford Banks, NC	Fair
Gateway National Rec. Area (NPS), City	Rockaway Beach, NY	Fair
Fire Island National Seashore (NPS), State, County, Private	Fire Island, NY	Poor
Mackay Island National Wildlife Refuge (USFWS)	Currituck Banks, NC	Poor
Cape Romain National Wildlife Refuge (USFWS)	Cape Island, SC	Poor
Cape Romain National Wildlife Refuge (USFWS)	West Cape , SC	Poor
Cape Romain National Wildlife Refuge (USFWS)	Lighthouse Island, SC	Poor
Camp Lejeune Marine Base (DoD)	Onslow Beach, NC	Fair
State Lands		
State	Hammocks Beach, NC	Excellent
State, Private	Bogue Banks, NC	Excellent
State, Private?	Westhampton Island, NY	Good
State, Town	Jones Beach, NY	Good
State, Private	Huntington & Litchford Beaches, SC	Good
State	Masonboro Island, NC	Fair
State, Private	Myrtle Beach, SC	Fair
State	Bird Shoals, NC	Poor
State, Private	Cape Fear, NC	Poor
Other Lands		
Private	Holden Beach, NC	Excellent
Private	Ocean Isle Beach, NC	Excellent
Private	Topsail Beach, NC	Good
Private	Wrightsville Beach, NC	Good
Private	Pawleys Island, SC	Good
Private?	Southampton Beach, NY	Fair
Private	Hutaff's Beach, NC	Fair
Private	Figure-8 Island, NC	Fair
Private	Long Beach, NC	Fair
Private	Sunset Beach, NC	Fair
Private	Bird Island, NC/SC	Fair
Private	Kure Island, NC	Poor
Private	Waites Island, SC	Poor
Private	Debidue Island, SC	Poor
Private?	North Island, SC	Poor
Private?	Raccoon Key, SC	Poor
Private	Lea Island, NC	Unknown

The Karner blue butterfly

Lycaeides melissa samuelis

Federal Status: Listed Endangered by the U.S. Fish and Wildlife Service on December 22, 1992.



Description

The Karner blue was first distinguished in 1944 by Vladimir Nabokov: famous novelist and butterfly enthusiast. This gossamer-winged butterfly is smaller than a silver dollar. The male has silvery blue wings fringed with a black border, and the female has grayish brown wings irregularly fringed with orange spots.

Habitat and ecology

The Karner blue requires grassy or prairie like openings with wild lupine and nectar sources such as dogbane, New Jersey tea, and butterfly weed. In the East these openings occur in sandplain communities usually within very dry pitch pine/scrub oak barrens. In the Midwest, the butterfly also requires very dry sandy areas including oak savanna, jack pine areas, and dune communities. The Karner blue always occurs with other rare butterflies and has two annual generations of adults, one in late spring, the other in summer. The ecology of this species is closely linked to fire. Historically, natural wildfires helped to maintain the habitat for the Karner blue as well as other rare butterflies and plants. Development and alteration of historic fire patterns are known causes of the decline of the Karner blue.

Historic range and current distribution

The distribution of the Karner blue butterfly generally follows the northern limits of the wild lupine which is the only food source for the butterfly while it is a caterpillar. It once had major populations in all states in the Great Lakes region as well as southern Ontario and eastward to New Hampshire and Massachusetts. However, it has been observed by those studying the butterfly that over the past 100 years, numbers of the Karner blue have diminished range-wide by 99 percent or more. This butterfly is now restricted to remnant populations in Minnesota, Wisconsin, Michigan, Indiana, New York, New Hampshire, and Illinois. It is completely extirpated from Massachusetts, Pennsylvania, Ontario and Ohio, and its long term prospects in New Hampshire, Illinois and Minnesota are poor due to small numbers and fragmented habitat.

Reasons for decline

Habitat destruction and fragmentation due to development, and declining frequency of wildfires that once created natural openings in the canopy for the wild lupine and understory nectar sources.

State by state summary

At the majority of places it is currently found this butterfly is threatened with extirpation. This is because *sites with fewer than 1,000 adults per year have been found not to be viable*; this concept is essential for understanding the concern for this species' survival.

All of the major populations of this butterfly have been inventoried and are monitored by the state Natural Heritage Programs. The following population estimates are based on the second, or summer, annual generations.

Minnesota—The presence of two historical records of the Karner blue in Minnesota prompted additional surveys that turned up essentially one extant population with more than 100 individuals on a state wildlife management area.

Wisconsin—While it is believed that at one time there were many large populations, 1990-1992 Status Surveys found many of the populations are now widely scattered and small, 70% had 50 or fewer adults observed. Two thirds of the sites where the butterfly is currently extant are owned by the Wisconsin Department of Natural Resources, the U.S. Fish and Wildlife Service, or the Department of Defense.

Michigan—There were over two dozen historical locations, but now only 6 counties still support the butterfly. Most all of the remaining populations are small. The largest population in Michigan was only estimated at 3,000 individuals in 1989. This population occurs in a State Game Area. There is also a population on National Forest land.

Illinois—In 1992 several individuals were discovered on state land. Previously, the Karner blue had not been recorded in Illinois since two specimens were found around the turn of the century.

Indiana—Occurs in two counties in Indiana. The largest population was estimated to have 4,500 adults in 1992 and occurs on National Park Service land. Two very small sites with more than a dozen individuals total are managed by The Nature Conservancy and the local County Parks Department.

New York—Although there are numerous small populations in New York, for reporting purposes they can be combined into two regional populations. One is in the Albany Pine Bush, where the butterfly was first discovered by Nabokov, and the other is located north of the Albany Pine Bush and currently consists of several fragmented sites the largest of which occurs at an airport. This population persists with numbers estimated around 14,000. Populations in the Albany Pine Bush are estimated to have dropped from 80,000 individuals in 1979, to around 1,000 in 1987, to 100-200 in 1990. The majority of extant sites are municipally or privately owned, but other land owners include a State Park, The Nature Conservancy, and Saratoga County

New Hampshire—Two very small remnant populations exist within the Concord Pine Barrens. While the total populations were estimated at 2,000-3,000 individuals in 1983, there are now believed to be far fewer than 500 individuals. The larger of the two populations occurs on less than a three acre plot of privately owned land.

Benefits of the Endangered Species Act

Protection of habitat for this species will conserve many other rare and declining species as well. In New England and New York pine barrens are considered to be one of the rarest community types and similarly in the Midwest the oak savanna ecosystem has declined dramatically. These communities often contain other federal candidate species as well as a number of state listed species.

The funding available to date through the U.S. Fish and Wildlife Service for the status surveys and research has leveraged many times that amount of funding and support for state Heritage Programs, The Nature Conservancy, and others for inventory, management, monitoring, research and protection activities.

Natural Heritage Program & Conservation Data Center Network

Natural Heritage Programs (NHPs) and Conservation Data Centers (CDCs) are continually updated, computer-assisted inventories of the biological and ecological features and biodiversity preservation of the country or region in which they are located. These data centers are designed to assist in conservation planning, natural resource management, environmental impact assessment and planning for sustainable development.

The Network: Where are The NHPs and CDCs

There are now 85 data centers operating in the western hemisphere including all 50 U.S. states (most are called Natural Heritage Programs), several U.S. Bioreserves and National Parks, Puerto Rico, three Canadian provinces, and 13 countries in Latin America (CDCs) and the Caribbean. Regional centers provide administrative and technical support to the individual programs.

Each data center is established within a local institution, most frequently as part of a government agency responsible for natural resource management and protection. While individual centers are under local control and are staffed by local scientists and conservationists, they also operate within a network.

Methodology: How the NHPs and CDCs Work

Most data centers use the Biological and Conservation Data System as the basis for operation, a system developed and refined by The Nature Conservancy since 1974. The information is managed in more than 30 interrelated computer files, supported by extensive map and manual files, and a library. A trained staff of biologists, natural resource specialists and data managers interprets the data for use in local conservation and development planning, natural resource management and environmental impact assessment.

Information assembled and managed by data centers focuses on: ecosystems and species, their biology, habitats, locations, conservation status and management needs; managed areas such as National Parks, Forest Reserves, and watersheds; and on data sources.

Each center compiles information from existing sources such as scientific literature, knowledgeable people, and museum collections. The local staff also directs and conducts field inventories of species and natural communities of special concern, or may be contracted for biological assessments of specific sites. Each study and report benefits from earlier work in the same area and, through the network, related information gathered at other times and places multiplies the local effort. Central databases are supported through cooperative agreements with academic and scientific institutions.

The Nature Conservancy's Role

The Nature Conservancy is involved in the establishment and operation of the CDCs by providing technical, scientific and administrative support and training. The Conservancy also makes available the computer technology, data inventory and management methodology, and procedure manuals used by CDCs and Natural Heritage Programs. The methodology constantly undergoes improvements as part of the partnership between the data centers and The Nature Conservancy. These continual advancements ensure that the entire network remains responsive to the needs of the conservation and development communities.

All told, there are over 400 biologists and computer technicians dedicated to the combined effort, with several hundred others working part-time on biological inventories and research. The Nature Conservancy is the administrative center of this network, promoting communications and the exchange of data, solutions and expertise throughout the network.

Applications: How NHPS and CDCs Are Used

Conservation Planning: The data center's integrated biological and land-use information is used to identify critical areas in need of protection, and to establish conservation priorities on a regional, national and global basis.

Development Planning: To help facilitate design and implementation of ecologically sound development projects, data centers provide biological and ecological information to multilateral development banks, bilateral development agencies, corporations both multi-national and local, as well as in-country governmental agencies.

Park and Protected Area Management: Wise stewardship of natural areas requires detailed knowledge of sensitive and endangered biological features. Information maintained by Heritage Programs and CDCs on parks, forest reserves, and wild areas, and the management requirements of their biological elements, is used to improve management practices.

Research and education: Results from each center's inventory work guides new basic applied scientific research. The biological databases represent an important resource for long-term environmental monitoring.

The U.S. Network of Natural Heritage Data Centers

ALABAMA NATURAL HERITAGE SECTION
Dept of Conservation & Natural Resources
Folsom Administration Bldg - Div. of Lands
64 N. Union St, Room 421 Montgomery, AL 36130
205-242-3484   FAX: 205/242-0999

ALASKA NATURAL HERITAGE PROGRAM
707 K Street, Suite 208 Anchorage, AK 99501
907/279-4549   FAX: 907/258-9139

ARIZONA HERITAGE DATA MANAGEMENT SYSTEM
Habitat Branch, Arizona Game & Fish Dept.
2221 W. Greenway Rd., Phoenix, AZ 85023
501/789-3612 FAX: 602/324-9154

ARKANSAS NATURAL HERITAGE COMMISSION
Suite 1500, Tower Building
323 Center St. Little Rock, AR 72201
501/324-9150   FAX: 501/324-9154

CALIFORNIA NATURAL HERITAGE DIVISION
The Resources Agency-Dept of Fish & Game
1416 9th St, 12th Flr, Sacramento, CA 95814
916/322-2493   FAX: 916/324-0475

COLORADO NATURAL HERITAGE PROGRAM
c/o University of Colorado Museum
Hunter 115, Campus Box 315 Boulder, CO 80309-0315
303/492-4719   FAX: 303/492-5105

CONNECTICUT NATURAL DIVERSITY DATABASE
Natural Res.Ctr, Dept of Environmental Protection
State Office Bldg, Rm 553, 165 Capitol Ave
Hartford, CT 06106
203/566-3540   FAX: 203/566-7932

DELAWARE NATURAL HERITAGE PROGRAM
Parks & Recreation, 89 Kings Highway Dover, DE 19903
302/739-5285   FAX: 302/739-3817

FLORIDA NATURAL AREAS INVENTORY
1018 Thomasville Rd., Suite 200-C
Tallahassee, FL 32303
904/224-8207; 224-0626 FAX: 904/681-9364

GEORGIA FRESHWATER WETLANDS & HERITAGE INVENTORY
Game and Fish Div., Georgia Dept of Natural Resources
2117 U.S. Highway 278 S.E. Social Circle, GA 30279
706/557-2514   FAX: 706/557-2770

HAWAII HERITAGE PROGRAM
1116 Smith St, #201 Honolulu, HI 96817
808/537-4508   FAX: 808/545-2019

IDAHO NATURAL HERITAGE PROGRAM
Dept of Fish & Game, 600 S. Walnut St, Box 25
Boise, ID 83707
208/334-3402   FAX: 208/334-2114

ILLINOIS NATURAL HERITAGE DIVISION
Dept of Conservation   524 S. 2nd St
Springfield, IL 62706
217/785-8774   FAX: 217/785-8277

INDIANA HERITAGE PROGRAM
Div. of Nature Preserves, Dept Nat.Resources;
402 W. Washington St; Rm W267
Indianapolis, IN 46204
317/232-4052   FAX: 317/232-8036

IOWA NATURAL AREAS INVENTORY
Bureau of Preserves & Ecol. Services
Dept of Nat.Resources, Wallace State Office Bldg
Des Moines, IA 50319
515/281-8524   FAX: 515/281-8895

KANSAS NATURAL HERITAGE INVENTORY
Kansas Biological Survey
2041 Constant Ave Lawrence, KS 66047-2906
913/864-3453   FAX: 913/864-7789

KENTUCKY HERITAGE PROGRAM
KY Nature Preserves Commission
407 Broadway Frankfort, KY 40601 502/564-2886

LOUISIANA NATURAL HERITAGE PROGRAM
Dept of Wildlife & Fisheries
PO Box 98000 Baton Rouge, LA 70898-9000
504/765-2821   FAX: 504/765-2607

MAINE NATURAL HERITAGE PROGRAM
Office of Community Development
State House Sta.130, 219 Capitol Ave. Augusta, ME 04333
207/624-6800   FAX: 207/624-6810

MARYLAND NATURAL HERITAGE PROGRAM
Dept of Nat. Resources E-1, Tawes Bldg
Annapolis, MD 21401
410/974-2870   FAX: 410/974-5592

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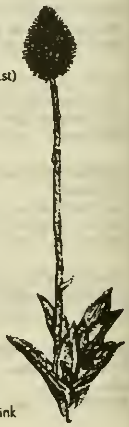

Swamp pink

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Endangered Resources Branch
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Salt Lake City, UT 84116-3193
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Midwest Heritage Task Force (MHTF)
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Boulder, CO 80302
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CITY OF SAN ANTONIO

NELSON W. WOLFF
MAYOR

TESTIMONY OF MAYOR NELSON W. WOLFF,
ON BEHALF OF THE
CITY OF SAN ANTONIO
BEFORE THE
COMMITTEE ON MERCHANT MARINE AND FISHERIES
U.S. HOUSE OF REPRESENTATIVES
APRIL 1, 1993

TESTIMONY OF MAYOR NELSON W. WOLFF,
ON BEHALF OF THE
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APRIL 1, 1993

- Mr. Chairman, members of the Committee . . .
- As Mayor of San Antonio, the nation's 9th largest city, I appreciate this opportunity to tell you how the Endangered Species Act in the case of the Edwards Aquifer is being used to HARM the environment . . . how it is being interpreted to bring enormous economic cost and hardship to a relatively poor city whose majority population is made up of minorities . . . and how it is being used as a pawn to gain additional water rights for the Guadalupe-Blanco River Authority, all in the name of preserving endangered species.
- I would also like to share with you a few ideas on how the Endangered Species Act should be changed and how we as a nation may better manage our natural resources to within the intents and purposes of the Act.

- San Antonio — a city of one million people — sits in the middle of the huge, 180-mile-long Edwards Aquifer, which contains some 25 million acre feet of water.

- Seventy percent of the aquifer's recharge occurs in the two rural counties to the west of San Antonio.

- The water moves west to east in the aquifer's limestone formations, under the city of San Antonio, and spills out in two springs — Comal and San Marcos — to the northeast of us.

- The Edwards Aquifer is like a bucket with holes in it — and those two big springs are the holes in the bucket . . . rainwater flows in one end of the aquifer, and runs out the other end through the springs.

- The Edwards has rapid recharge capability . . . A big rain to the west will be noted rapidly in aquifer levels to the east.

- Current pumpage for irrigation, municipal and industrial usage from the Edwards is approximately 540,000 acre feet annually, the average recharge of 650,000 acre feet.

- The Edwards Aquifer is the sole source of drinking water for the city of San Antonio . . .

- Indeed, it was the FIRST sole source aquifer to be designated as such by the U.S. Environmental Protection Agency pursuant to special provisions of the Safe Drinking Water Act of 1974.

- But earlier this year, Federal Judge Lucious Bunton ruled that in order to protect the fountain darter — an endangered species in Comal Springs — a level of springflow must be assured in order to prevent a "taking" of the species.

- The interpretation of the ruling by the Texas Water Commission is that annual pumpage from the aquifer cannot exceed 225,000 acre feet — a 60 percent reduction in our current pumpage.

- Let me repeat: an annual pumping reduction of SIXTY PERCENT from San Antonio's sole water source.

- His rationale for that ruling was that Comal Springs temporarily went dry in the severe drought of the 1950s — and that cutting back pumping levels to 225,000 acre feet annually would ensure continuous springflow at Comal, even during a "drought of record."

- The Judge made his ruling even though the fountain darter, which is like a little minnow, thrives in the hundreds

of thousands in nearby San Marcos Springs, which has NEVER gone dry in recorded history.

• Further, the Judge made his sweeping ruling even though the Texas Water Commission has data that clearly indicates that the drought of the 1950s was an extreme event likely occurring only once in a 200- to 300-year time frame.

• Keep in mind that the Judge's ruling is not about a NEW project like a dam or a highway . . . Instead, he is ruling against an ONGOING, HISTORIC activity dating back more than 100 years.

• The economic, environmental and human costs of such a ruling are enormous.

• The Texas Water Commission has stated: "A reduction that drastic, as long as the Edwards is the only water supply for much of this region, creates UNACCEPTABLE risks to public health and safety and could devastate the region's economy."

• The Commission went on to say that the development of additional water supplies to make up for the cutback and for growth would "require a massive undertaking UNPARALLELED in the region's history, and perhaps in the history of the State of Texas."

• To create an estimated 270,000 acre feet of new surface reservoirs would require the flooding of a huge land area . . . which besides uprooting people and destroying THEIR habitat, would undoubtedly disturb the habitat of God knows how many other endangered species we have not even heard about yet.

• Of course, there would be environmental objections to the building of such reservoirs . . . and if we managed to overcome those objections and win the necessary federal permits, the estimated capital cost and debt service for the city of San Antonio would be more than FOUR BILLION DOLLARS. . . And that's not to mention the expanded cost for re-use, conservation and retrofit of existing facilities.

• Even more important, the effect of the ruling on our economy would be catastrophic . . .

• Businesses WON'T COME to communities that don't have an assured water supply . . . and businesses that are already there are likely to move . . .

• Our own economic projections show a potential job loss to San Antonio of more than 100,000 — MORE THAN 100,000 breadwinners and families without jobs — if the

judge's ruling is allowed to stand. . . No community can stand such a loss.

• The Endangered Species Act is being ABUSED in such a way that we can't make optimum use of an existing resource, the Edwards Aquifer . . . even though an Aquifer management plan which would ensure the safety of the endangered species while also maximizing the yield from the Aquifer is now making its way through the Texas Legislature.

• The Endangered Species Act is being used as a way to preclude droughts, which are natural occurrences that only God controls.

• The Act is being used as a smokescreen by the Guadalupe-Blanco River Authority — to the east of San Antonio — in order to gain more water for its customers.

• There is a public backlash when the Endangered Species Act is used capriciously, as it is now being used against the one million people of San Antonio and our neighboring farming communities.

• If you think the spotted owl has caused controversy, wait until this Act is used against every city in the United States in an attempt to control economic and population

growth, and against every farmer who relies on ground water.

- If it can be used against the nation's 9th largest city, it can be used against many others.

- Before interpretations like Judge Bunton's begin to spread across the nation, I suggest that you consider amending the Endangered Species Act to take into consideration ECONOMIC and HUMAN concerns.

- Endangered species CAN survive in more than one designated habitat . . . In our particular case, when Comal Springs went dry for five and a half months in the 1950s, the fountain darters were removed and reintroduced in 1975.

- They also survive today in San Marcos Springs, just a few miles from Comal Springs.

- Fountain darters easily can be collected, maintained and propagated in the laboratory.

- But the judge concluded that the Act did not give him the freedom to consider this fact.

- Endangered species like the fountain darter should be preserved by laboratory reproduction and then released into the wild in areas where they will not negatively impact fragile eco-systems . . . The fountain darter should never have been reintroduced into Comal Springs.

• But, if you are going to preclude the optimum use of an existing resource — one like the Edwards Aquifer, which has been used continuously for well over a century — then local governmental and private entities should be compensated for the loss . . . rather than throwing the entire price tag — as Judge Bunton has done — in San Antonio's lap and saying "Good luck."

• Most important, I believe the federal government can use a carrot rather than a stick to WORK with local governments and the private sector to help preserve the environment through the acquisition of additional land for habitats for endangered species.

• Two weeks ago, the City of San Antonio, through its water system, agreed to pay one-fourth of the purchase price of a 4,800-acre tract of environmentally sensitive land over the Edwards Aquifer recharge zone.

• The Department of Interior was asked to participate in the purchase, but they don't have funds for this purpose.

- Financial incentives to set aside lands for parks and habitats would be very helpful additions to the Endangered Species Act.

- With the millions of dollars all the lawyers are making in the Edwards Aquifer case, we could have quadrupled our purchase of land for habitat. . .

- The Endangered Species Act is being used effectively to preserve lawyers, who are not an endangered species.

- The City of San Antonio has one of the lowest per capita uses of water in the United States . . .

- We have a stringent ongoing water conservation plan, a drought management plan and a water re-use plan. . . all of these are, in effect, "new" sources of water.

- We support regional management of the Edwards Aquifer to limit pumpage beyond our historic use so that all of us who use the aquifer can have benchmarks established for future water planning. . .

- We support the optimum use of the aquifer through additional recharge and augmentation of the springs.

- In short, we're working hard to be good, responsible citizens.

- **We are anxious to preserve our environment, but what we need are common-sense expertise and financial assistance . . . NOT federal dictates.**
- **Thank you.**

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON
MERCHANT MARINE AND FISHERIES

SUBCOMMITTEE ON
ENVIRONMENTAL AND NATURAL RESOURCES

HEARING ON HOW TO IMPROVE THE CONSERVATION OF OUR BIOLOGICAL RESOURCES, IMPORTANT HABITATS AND ECOSYSTEMS

APRIL 1, 1993

Written Submission
of John H. Specht
General Manager, Guadalupe-Blanco
River Authority of Texas

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THE PRESENT EMERGENCY

An entire region of Texas is not prepared for major droughts. The region includes San Antonio, the 11th largest city in the United States. This entire region is not prepared for major droughts, because its water supply is inadequate.

San Antonio and most others in the region have not developed any water supplies from any sources, other than simply pumping water from a precious natural resource: the southern portion of the Edwards Aquifer. The amount of water that can safely be supplied from the Aquifer in a major drought is woefully inadequate to satisfy the present demand of the region.

The risk of a major drought occurring in the near future is real and substantial. The next major drought could begin tomorrow. This risk constitutes a ***present*** emergency.

Every major city in Texas and the nation evaluates the adequacy and security of its water supply based on the assumption that the worst drought of record that actually occurred in its area will be repeated. For most areas of Texas, including the Edwards region, the drought of record was the drought that began the late 1940's and ended in 1957, just 36 years ago. Every city needs to be able to say to its citizens, and to the people, businesses and industries that are considering moving to that city, that their demands for water will be substantially satisfied without shortage in a repeat of the drought of record. All major cities in Texas, ***except San Antonio***, can satisfy this basic, longstanding test. San Antonio cannot, because it has failed to develop water supplies from sources other than the Edwards Aquifer.

The "firm yield" of the Edwards Aquifer is approximately 200,000 acre-feet of water per year. In other words, it can provide 200,000 acre-feet of water per year, without shortage, throughout major droughts as severe as the drought of record, on a long-term sustainable basis. Based on information available since the drought of record ended 36 years ago, it has been known that this amount of water, but no more, can be pumped from the Aquifer in a repeat of the drought of record without causing unacceptable harm, or unacceptable risk of harm, to the biological and natural resources and important habitats and ecosystems affected by that pumping. The federal District Court in ***Sierra Club v. Lujan***, No. MO-91-CA-069, recently confirmed that pumping must be limited to approximately this amount, in a repeat of the drought of record, both to avoid jeopardizing the continued existence of endangered and threatened species, and to avoid contamination of the fresh water in the Edwards by encroachment of adjacent bad-quality water containing high concentrations of minerals and hydrogen sulfide, a hazardous substance. *See* Tab 15, Findings 49-53, 88, 201-202, 207.

The Edwards is a tremendous natural water-supply resource. No other river or other natural body of water in Texas can provide a firm yield of 200,000 acre-feet per year on a sustainable basis. Surface rivers need to be dammed in order to provide firm yields of that magnitude. The Edwards is truly unique.

However, pumping from the Edwards currently far exceeds its firm yield. Pumping has increased unchecked from an average of slightly over 200,000 acre-feet per year during the drought of record, to in excess of 500,000 acre-feet per year today. *See* Tab 5. The most notable example of this unrestrained pumping is the Catfish Farm well, an artesian well in the Edwards that flows at a rate of about 44 million gallons a day, or about 50,000 acre-feet per year. The 30" well shoots a geyser of water about 25 feet in the air. *See* photograph under Tab 6.

The Edwards Aquifer is perhaps the most diverse underground aquatic ecosystem in the world. The unregulated withdrawals of water from the Aquifer threaten the endangered Texas Blind Salamander (*see* photograph under Tab 9), and the various species of blind catfish and other unique creatures that live underground in the caverns and passageways of the Aquifer and nowhere else on earth.

The unregulated withdrawals of water from the Edwards Aquifer also threaten to dry up the two largest springs in the entire Southwest United States, the Comal Springs in New Braunfels, and the San Marcos Springs in the City of San Marcos, thereby destroying endangered and threatened species of aquatic wildlife and plants found at these two springs and nowhere else on earth. This overuse of water also threatens the biological health of the entire Guadalupe River Basin downstream of the two springs, including the health and productivity of the San Antonio Bay and Estuary, which receive freshwater inflows from these springs.

The unregulated withdrawals of water from the Edwards Aquifer also threaten to permanently ruin the Aquifer as a water supply. If the Comal Springs were allowed to dry up, contamination of the fresh water in the Aquifer by adjacent, highly-mineralized water containing hydrogen sulfide, a hazardous substance, will occur. The water supply to many cities, industries and farmers located downstream of the springs in the Guadalupe River Basin would also be destroyed, because of lack of springflow.

Obviously, the damage described above cannot and will not be allowed to happen. Pumping from the Edwards Aquifer must be regulated to whatever levels are required to protect the biological resources of the Aquifer, the Springs, and the Guadalupe River Basin downstream of the Springs. The same level of regulation is needed to protect the Aquifer as a water supply for those who pump from it, and to protect the water supply of those located downstream of the Springs who rely upon springflows.

The current level of pumping may be sustainable during wet years, but not at other times. As discussed above, pumping must be reduced to approximately 200,000 acre-feet per year during severe droughts.

The problem is that the region has done nothing to prepare to make the reduction in pumping from over 500,000 to approximately 200,000 acre-feet per year. There is no plan in place to make this reduction. Unless the State of Texas develops and fully implements such a plan before the next major drought, there will be chaos when that drought occurs. Those needing water during that drought will be forced, by the "blunt axe" of federal intervention under the Endangered Species Act and federal water quality laws, to curtail pumping substantially below the amounts they need.

ACTIONS NEEDED TO END THE PRESENT EMERGENCY

The emergency will end only when the region is properly prepared for a drought at least as severe as the drought of record. This will occur only when two things happen: (1) The State of Texas properly regulates withdrawals from the Edwards Aquifer, so that pumping can be systematically, equitably and timely reduced to whatever levels are needed at all times throughout that drought; and (2) sufficient water is actually available, from whatever sources, to substantially satisfy all demands during such a drought, without shortage.

1. The Texas legislature must impose adequate regulation of withdrawals from the Edwards Aquifer immediately.

GBRA and everyone else involved in this matter sincerely want the needed pumping regulation to be by the State of Texas, and not the federal government. However, this resource must be protected. As indicated in Judge Bunton's Judgment, the "blunt axe" of federal intervention will fall if the Texas legislature fails to resolve this problem by May 31, 1993, the end of the current legislative session. *See* Judgment at Tab 14; and Tab 15, Finding 196.

Ongoing efforts by GBRA and the Texas Water Commission to impose state regulation based on current law and a claim that the State of Texas holds title to the water in the Edwards Aquifer have stalled. *See* Tabs 10-13. Absent new legislation, these efforts are unlikely to result in commencement of regulation before May 31.

2. Sufficient quantities of water from other sources must be developed as quickly as possible.

Sufficient quantities of water from other sources can be developed within 5-10 years so that, by that time, demands for water in the region can be substantially satisfied, without shortage, in a repeat of the drought of record. This time frame is consistent with that found by Judge Bunton. *See* Tab 15, Finding 205. This can be done without having to build any new water supply reservoirs. The necessary supplies can be developed by that time by eliminating waste, by improving water use efficiency, by reuse, by artificial recharge, and by the supply of water from other, existing sources.

The hope is that a major drought will not occur before that time. If it does, then exemptions under federal law could be sought, if absolutely necessary. *See* Tab 15, Findings 208-209. However, the threat of crisis is not eliminated merely by assuming that, if a serious drought does occur, then San Antonio and other pumpers will be allowed to pump substantially more than 200,000 acre-feet per year from the Edwards. That would require the granting of exemptions by the "God Committee" under the federal Endangered Species Act, authorizing both the Comal and San Marcos Springs, the two largest springs in the entire southwest United States, to dry up, thereby killing endangered species, jeopardizing their continued existence and perhaps causing their extinction. That would also require the granting of other exemptions under applicable federal and state water-quality laws authorizing the release of hazardous substances into the fresh water in the Edwards. No such exemptions have been granted and, for obvious reasons, it should not be assumed that they will be. San Antonio and other pumpers should do everything reasonably possible to avoid having to ask for any such exemptions. A request by San Antonio for such exemptions means that it proposes to pump the Edwards down to levels that will draw hazardous substances into the fresh water in the Edwards. At some point, this would permanently ruin the Edwards as a water supply for everyone. No one knows the level at which this disaster would occur.

HOW THE PRESENT EMERGENCY COULD HAVE, AND SHOULD HAVE, BEEN AVOIDED

1. **The State of Texas years ago should have defined the ecosystem to be protected by state regulation to be the entire surface-subsurface-surface river system.**

The present emergency could have been avoided if the State of Texas recognized years ago, before pumping got out of hand, what is absolutely clear, and what the Texas Water Commission recognizes today: the Edwards Aquifer is an integral part of a much larger ecosystem. It is an underground stream. More precisely, the Edwards Aquifer is the underground, middle segment of a continuous surface-subsurface-surface stream system.

This stream system extends across and connects three surface river basins. The waters flowing in the western surface streams that feed the Edwards literally disappear as they dive underground into the Edwards -- the rivers often have healthy surface flows down to the entry points, and then are bone dry downstream of those points. From those entry points, the Edwards conveys that same water underground to the east, where that same water surfaces again at the two largest springs in the entire southwest United States: the Comal Springs in New Braunfels, and the San Marcos Springs in San Marcos. The flows from those two springs are the lifeblood of the Guadalupe River. During dry periods, most of the flow in the Guadalupe River comes from those springs. Those springflows are needed to protect instream flows, bays and estuaries and the water supply of those downstream of the springs.

The springs themselves are natural treasures. Several federally-listed endangered and threatened species live only at and immediately downstream of these springs and they rely on their springflows. They are the Fountain Darter, Texas Wild-Rice, the San Marcos Salamander and the San Marcos Gambusia.

Thus, the Edwards is an underground conduit that conveys hundreds of thousands of acre-feet of surface water each year from west to east. It is a long and relatively narrow conduit. It has boundaries that are defined at least as precisely as, and in many or most cases much more precisely than, the boundaries of surface streams. Its underground caves and passageways look a lot like a braided surface stream (all of the braids of a braided stream comprise just one watercourse). Water flows in those underground caves and passageways at rates that are up to several thousand times faster than virtually all other groundwater in Texas. There are blind catfish that live deep underground in those caves and passageways, along with some 40 other aquatic species. One of those species, the Texas Blind Salamander, is a federally listed endangered species.

The waters in the western surface streams that feed the Edwards have been determined to be state water (water that is owned by the State of Texas in trust for the benefit of the public) right to the points where those waters dive underground into the Edwards. These same waters have been determined to be state water right from the points where they leave the Edwards at the Comal and San Marcos Springs.

The issue is who holds title to this same water as it flows underground in the conduit. GBRA, the Texas Water Commission and others believe that the water remains state water as it flows through the Aquifer and, therefore, that the Commission has the authority and duty, under existing state water law, to regulate withdrawals from the Aquifer to protect the entire surface-subsurface-surface stream system. The issue of who holds title to the waters of the Edwards is now being decided in the Texas courts.

However, regardless of who holds title to the water as it flows through the Aquifer, the Texas legislature should have recognized long ago that the Edwards was part of just one, integrated river system, and that the withdrawals from the Edwards needed to be regulated to protect the entire system. It did not. It still has not. Judge Bunton has strongly urged that the Texas legislature do so, not later than May 31, 1993, the end of the current legislative session.

2. **The State of Texas years ago should have defined the limits on pumping from the Edwards Aquifer that are needed to protect the entire ecosystem.**

The present emergency could have been avoided if the State of Texas, San Antonio and others acknowledge years ago that the Edwards simply cannot supply more than about 200,000 acre-feet of water per year in a repeat of the drought of record without causing significant, irreparable harm to the biological and natural resources, important habitats and ecosystems. The State could have made this determination right after the drought ended in 1957.

The State should have concluded at that time that would be unacceptable to dry up the Comal Springs again. It should have concluded that it would be unacceptable to allow again the water quality harm that did actually occur during the drought, and that the Comal Springs needed to continue to flow to avoid the risk of that harm. it should have concluded that the firm yield of the Aquifer was about 200,000 acre-feet per year.

Unfortunately, the State failed to act, and it has continued to fail to act for 36 years now.

3. USFWS years ago should have defined the minimum springflows needed to avoid takings of, and jeopardy to, endangered and threatened species.

The present emergency could have been avoided if the USFWS years ago defined the biologically required minimum springflows needed to protect the endangered and threatened species that live at and downstream of the Comal and San Marcos Springs, and those that live underground in the Aquifer itself.

An entire section of the separate Findings of Facts and Conclusions of Law adopted by Judge Bunton (*see* Tab 15) addresses USFWS' failure to make these essential biological findings. Those Findings and Conclusions are as follows:

* * *

The Federal Defendants Have Unlawfully Refused or Unreasonably Delayed Implementing Recovery Measures to Protect Minimum Springflow Quantities

155. As the San Marcos Recovery Plan was being finalized in 1984, the Comal Springs nearly dried up. (Thornhill Testimony).

156. When Regional Director Spear sent the San Marcos Recovery Plan to Washington, D.C. for top-level USFWS approval in 1985, he stated the USFWS' major recommendations, including achievement of pumping controls, would be "quite difficult" and "controversial." (PX-55).

157. The USFWS did not convene a meeting of the San Marcos Recovery Team between July 20, 1984 and March 29, 1989. (Admission 14).

158. USFWS biologist Tom Brandt worked in 1986-1988 on keeping Fountain Darters in refugia. This study was not aimed at establishing minimum continuous flow requirements. Dr. Brandt performed this study because he, his superiors at the National Fish Hatchery in San Marcos, and their superiors at the Region 2 office of the USFWS in Albuquerque, New Mexico knew there were going to be problems with the Fountain Darter in the future, due to pumpage of Edwards groundwater and lack of rainfall. (PX-244).

159. In March 1989, Professor Whiteside warned the USFWS about the potentiality the "Comal might go dry again this summer." (PX-42).

160. In the summer of 1989, Alisa Shull, the USFWS scientist in charge of the San Marcos Recovery Plan, recommended the USFWS send

letters to Federal agencies requesting consultation on measures to reduce the threat to the springs posed by Edwards withdrawals and to pumpers, warning them of the potential for takes if pumping is not reduced. (Shull Testimony; Spear Testimony). The letters were drafted. (PX-61; PX-62; PX-63). Mr. Spear and the Federal Defendants at the Washington level decided not to use the "blunt axe" of Federal intervention but *to request the State to establish pumping controls "quickly" on a voluntary basis.* (Spear Testimony). Three years later, the State has *still not established meaningful pumping controls.* (Spear Testimony; Shull Testimony).

161. Defining minimum springflows is a matter that is "long overdue." (Spear; Hubbs Testimony). Even the USFWS now agrees, if Texas does not establish adequate pumping controls in the next regular session of the Texas Legislature, which began in January of 1993, the "blunt axe" must fall. *(Id.)*.

162. Those who withdraw water from the Edwards need to know the minimum springflows at the Comal Springs below which takings begin to occur, so they can restrict withdrawals to the extent necessary to avoid any takings, and so they can seek an incidental take permit to authorize such takings. (Spear Testimony; Shull Testimony; Masters Testimony; Hall Testimony).

163. To date, the Federal Defendants have failed or refused to determine the minimum springflow at the Comal Springs below which takes in violation of ESA § 9 begin to occur.

164. The Federal Defendants were formally advised of takes of Fountain Darters at Comal Springs by Plaintiff-Intervenor GBRA's first Notice of Violations dated June 15, 1989, and they were further advised of their failures to develop and implement recovery plans to prevent takes of and jeopardy to the listed species by the subsequent Notices of Violations by Plaintiff-Intervenor GBRA and the Sierra Club, dated February 17, 1990 and April 12, 1990, respectively (DX-31; DX-32; DX-33).

165. Unauthorized takings of Fountain Darters at the Comal Springs occurred in the summer of 1990, after the Federal Defendants received all of the Notices of Violation.

166. EUWD argues the USFWS does not have the resources necessary to enforce the San Marcos Recovery Plan, to implement and enforce recovery plant of the Texas Wild-rice and the San Marcos

Salamander, and to implement and enforce a recovery plan for the Fountain Darter at Comal Springs. However, lack of funding does not excuse the Federal Defendants' failures or refusals to implement key provisions of the San Marcos Recovery Plan responsive to the most serious threat, overdrafting of the Edwards. The key measures require little cash outlays by the USFWS. Federal Defendants can use existing USFWS and National Fish Hatchery employees. The measures can be done by competent, willing volunteers paid by others (for example, the TPWD), and working out of dedication to the species (for example, the San Marcos Recovery Team members who prepared the contingency plan). (Spear Testimony).

167. The Federal Defendants failed to take timely action to implement key steps in the San Marcos Recovery Plan, critical to the survival of the species, including: define minimum continuous springflows, encourage establishment of pumping controls, prepare the contingency plan, and vigorously pursue a systematic procedure of consultation.

168. The Court does not conclude the Federal Defendants must, without exception, immediately implement every step in every recovery plan. The Court concludes, however, the Federal Defendants may not arbitrarily, for no reason or for inadequate or improper reasons, choose to remain idle. Inaction eviscerates the recovery planning provisions of the ESA and amounts to an abdication of the Federal Defendants' statutory responsibility to plan for the survival and recovery, not the extinction, of endangered and threatened species.

* * *

4. San Antonio years ago should have developed alternative sources of water.

At least two cities that in the past relied solely on the Aquifer have developed alternate sources. Both the City of New Braunfels and the City of San Marcos have developed surface water supplies, supplies that will be firm and adequate to supply their needs in a repeat of the drought of record.

San Antonio, by far the largest user of water from the Aquifer, has done nothing.

Beginning in the late 1950's and extending through the 1960's, San Antonio did seek the permit to build Canyon Reservoir on the Guadalupe River. However, its application for that permit reflected that San Antonio merely intended to do to the Guadalupe River Basin what it is doing now, through excessive pumping from the

Edwards Aquifer -- dry it up. It said it wanted to build Canyon Reservoir and take every drop of yield away from the Guadalupe River Basin.

After the Texas Board of Water Engineers and the Texas Supreme Court rejected San Antonio's application, GBRA built Canyon Reservoir and made available to San Antonio reasonable amounts of water from the reservoir. In 1975, GBRA offered to sell San Antonio 50,000 acre-feet per year of stored water from Canyon Reservoir and other (as-yet unbuilt) projects, at cost. The GBRA Board approved a contract developed jointly by the two staffs. The San Antonio City Council then rejected the contract, by one vote.

Since then, GBRA consistently offered to sell San Antonio the remaining uncommitted portion of the yield of Canyon Reservoir, at cost. San Antonio has rejected all offers.

In fact, San Antonio has failed to develop any alternative sources of water. In that regard, Judge Bunton made the following findings of fact:

* * *

> 191. The serious water supply problem associated with rapid increases in population and municipal, industrial and agricultural water demand and exclusive dependence on the Edwards Aquifer by the City of San Antonio has been recognized for over thirty-five years. ***See Board of Water Engineers v. City of San Antonio***, 283 S.W.2d 722, 723 (Tex. 1955).
>
> 192. The City of San Antonio is blessed with a rare source of water. Unfortunately, the Edwards is currently the City of San Antonio's "sole source" of water because the City of San Antonio failed to develop adequate water supplies from other sources to reduce their reliance on the Edwards.

* * *

> 205. If the City of San Antonio would seriously and immediately develop additional supplies of water, implement conservation programs and mandates (like minimal lawn watering and credits for native landscaping), reuse water, and seek alternative sources of water, the City of San Antonio is likely to obtain substantial additional water supplies within five to ten years. (Thornhill Testimony; Specht Testimony).
>
> 206. If the region is fortunate enough to miss a major drought within the next five to ten years, the only significant economic impact on San

Antonio and the region resulting from satisfying the requirements under the ESA to maintain minimum springflows at the Comal and San Marcos springs would be the cost of obtaining additional supplies of water within the period of time. (Aceves Testimony; Perryman Testimony).

207. Approximately the same cost would have to be borne by San Antonio and the region, even if the needs of endangered species were disregarded entirely; adequate and continuous natural springflows are needed from the Comal and San Marcos Springs at all times to avoid the risk of significant adverse water quality impacts, solely for water supply purposes. (Aceves Testimony, Perryman Testimony).

* * *

San Antonio has even been warned by the Texas courts that it needs to develop additional supplies of water. For example, 38 years ago the Texas Supreme Court in ***Board of Water Engineers v. City of San Antonio***, 283 S.W.2d 722 (Tex. 1955) stated that "[t]he . . . city is faced with a serious water-supply problem by reason of a large and rapid increase in population and water consumption within and around its corporate limits, coupled with a serious fall in its potential underground water supply." *Id.* at 723. More recently, 18 years ago the San Antonio Court of Appeals in ***Royal Crest, Inc. v. City of San Antonio***, 520 S.W.2d 858 (Tex. Civ. App.–San Antonio 1975, writ ref'd n.r.e.) repeated San Antonio's own declarations. The court found that "[t]he Water Board . . . made extensive administrative findings, the pertinent parts of which may be summarized as follows: . . . (d) In the near future, metropolitan San Antonio will need a surface water supply to supplement its supply of water from the Edwards Reservoir. (e) The City is the only user of the Edwards Reservoir with sufficient resources to furnish such surface water supply. (f) Failure to provide a surface water supply will threaten the health, safety and general welfare of the community and its safe, orderly and healthful development of the community." *Id.* n8 at 868.

HOW POTENTIAL FUTURE EMERGENCIES RELATED TO THE EDWARDS AQUIFER CAN BE AVOIDED

Overcoming the present Edwards Aquifer emergency can create other potential biological resources/habitat/ecosystem emergencies.

One example relates to the need for water supplies from other sources. In the region's rush to get as much water as possible, as quickly as possible, it should not be forgotten that the ecosystems that rely on those other sources of water need protection also. Some proposals seem to have ignored this need. For example, one proposal on the table is to regulate withdrawals from the Edwards Aquifer so that minimum springflows are protected, but then to divert all of the springflow just downstream of the known and listed endangered species, thereby drying up the river downstream.

This proposal once again misses the point: the entire surface-subsurface-surface river system must be protected, all the way to the Gulf of Mexico. Anything short of providing that protection is simply another emergency waiting to happen. Short cuts should not be allowed. Adequate supplies of water can be obtained, quickly, without causing any environmental harm to other parts of the surface-subsurface-surface river system.

GENERAL AND SPECIAL LAWS
OF
THE STATE OF TEXAS

Passed By The
REGULAR SESSION
of the
SIXTY-FOURTH LEGISLATURE

Convened at the
City of Austin, January 14, 1975
and
Adjourned June 2, 1975

Published under the Authority of The State of Texas

MARK WHITE . . . . Secretary of State

GUADALUPE-BLANCO RIVER AUTHORITY— POWERS AND FUNCTIONS

CHAPTER 433

S. B. No. 1028

An Act amending Chapter 75, Acts of the 43rd Legislature, 1st Called Session, 1933, as amended (Article 8280—106, Vernon's Texas Civil Statutes), by amending Sections 1, 2, 7, 9, 11, 12, 13, 15, and 16 thereof; relating to the rights, powers, authority, privileges, and functions of the Guadalupe-Blanco River Authority; making certain provisions as to bonds and notes, offices, records, and audits of the district; finding notice of intention to introduce this Act; excepting from application or effect of this Act litigation begun prior to its effective date which questions the legality of acts or proceedings of the board or district; and declaring an emergency.

Be it enacted by the Legislature of the State of Texas:

Section 1. Chapter 75, Acts of the 43rd Legislature, 1st Called Session, 1933, as amended (Article 8280—106, Vernon's Texas Civil Statutes), is amended [11] so that Sections 1, 2, 7, 9, 11, 12, 13, 15, and 16 thereof shall read as follows:

"Section 1. There is hereby created within the State of Texas, in addition to the Districts into which the State has heretofore been divided, a Conservation and Reclamation District to be known as 'Guadalupe-Blanco River Authority' (hereinafter called the District) and consisting of that part of the State of Texas which is included within the boundaries of the Counties of Hays, Comal, Guadalupe, Caldwell, Gonzales, DeWitt, Victoria, Kendall, Refugio, and Calhoun. Such District shall be and is hereby declared to be a governmental agency and body politic and corporate, with such powers of government and with the authority to exercise such rights, privileges, and functions as may be hereinafter specified, and the creation of such District is hereby determined to be essential to the accomplishment of the purposes of Section 59 of Article 16 of the Constitution of the State of Texas, including (to the extent hereinafter authorized) the control, storing, preservation and distribution of storm and flood waters, the waters of rivers and streams, including the Guadalupe and Blanco Rivers and their tributaries for irrigation, power, and all other useful purposes, the reclamation and irrigation of arid, semi-arid and other lands needing irrigation, the reclamation and drainage of over-flowed lands, and other lands needing drainage (but not to reclaim or drain coastal wetlands or inland marshes), the conservation and development of the forests, water and hydro-electric power of the State of Texas and the navigation of inland waters, and the preservation and conservation of all such natural resources of the State are hereby declared public rights and duties of the District.

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[11] V.A.T.S. Water Auxiliary Laws, Table III.

"Nothing in this Act or in any other Act or law contained, however, shall be construed as authorizing the District to levy or collect taxes or assessments, or to create any indebtedness payable out of taxes or assessments, or in any way to pledge the credit of the State."

"Sec. 2. Except as expressly limited by this Act, the District shall have and is hereby authorized to exercise all powers, rights, privileges, and functions conferred by General Law, now in force or hereafter enacted, upon any District or Districts created pursuant to Section 59, of Article 16, of the Constitution of the State of Texas (excluding underground water conservation districts), and the same are adopted by reference. Without limitation of the generality of the foregoing, the District shall have and is hereby authorized to exercise the following powers, rights, privileges, and functions;

"(a) to control, store and preserve, within or adjoining the boundaries of the District, the waters of any rivers and streams, including the waters of the Guadalupe and Blanco Rivers and their tributaries, for all useful purposes, and to use, distribute and sell the same, within the boundaries of the District, for any such purposes;

"(b) to conserve, preserve and develop underground waters within the boundaries of the District (subject to any applicable regulation by the State or any political subdivision) for all useful purposes, and to use, distribute and sell the same, within the boundaries of the District for any such purposes;

"(c) to acquire water, water supply facilities and conservation storage capacity within or without the District from any person, including the State or any of its agencies and subdivisions and the United States of America and any of its agencies and subdivisions;

"(d) to use, distribute and sell, without the boundaries of the District, any waters which may be controlled, stored, preserved, conserved, developed or acquired by the District, if the Board hereinafter referred to determines that adequate provision can be made to continue to serve the water requirements within the boundaries of the District, provided the District shall not enter into any agreement which contemplates or results in the removal from the watershed of the Guadalupe and Blanco Rivers and their tributaries of any surface water of the District necessary to supply the reasonably foreseeable future water requirements for municipal uses during the next ensuing fifty-year period within such watershed, except on a temporary, interim basis;

"(e) to develop and generate water power and electric energy within the boundaries of the District and to distribute and sell water power and electric energy, within or without the boundaries of the District;

"(f) to prevent or aid in the prevention of damage to person or property from the waters of the Guadalupe and Blanco Rivers and their tributaries;

"(g) to forest and reforest and to aid in the foresting and reforesting of the watershed area of the Guadalupe and Blanco Rivers and their tributaries and to prevent and to aid in the prevention of soil erosion and floods within said watershed area;

"(h) to develop the navigation of inland waters within the boundaries of the District and any facilities in aid thereof;

"(i) to develop the reclamation and drainage of overflowed lands and other lands needing drainage within the boundaries of the District and any facilities in aid thereof (but not to reclaim or drain coastal wetlands or inland marshes):

"(j) to develop the collection, transportation, treatment, disposal and handling of any waste as such term may be defined by General Law and any facilities in aid thereof (but only with the consent of a city if sanitary sewer facilities for the collection, treatment and disposal of sewage are to be constructed or acquired within its corporate limits);

"(k) to conserve and develop waters and lands for recreation purposes and any facilities in aid thereof;

"(*l*) to acquire by purchase, lease, gift or in any other manner (otherwise than by condemnation) and to maintain, use and operate any and all property of any kind, real, personal, or mixed, or any interest therein, within or without the boundaries of the District, necessary or convenient to the exercise of the powers, rights, privileges and functions conferred upon it by this Act;

"(m) to acquire by condemnation any and all property of any kind, real, personal or mixed, or any interest therein, within or without the boundaries of the District (other than such property or any interest therein without the boundaries of the District as may at the time be owned by any body politic) necessary or convenient to the exercise of the powers, rights, privileges, and functions conferred upon it by this Act, in the manner provided by General Law with respect to condemnation or, at the option of the District, in the manner provided by the Statutes relative to condemnation by Districts organized under General Law pursuant to Section 59, of Article 16, of the Constitution of the State of Texas;

"(n) subject to the provisions of this Act from time to time sell, lease, or otherwise dispose of any property of any kind, real, personal, or mixed, or any interest therein, which shall not be necessary to the carrying on of the business of the District or the sale, lease, or disposition of which, in the judgment of the Board hereinafter referred to, is necessary or convenient to the exercise of the powers, rights, privileges and functions conferred upon the District by this Act or by General Law;

"(o) to overflow and inundate any public lands and public property and to require the relocation of roads, pipelines, transmission lines, railroads, cemeteries and highways in the manner and to the extent permitted to Districts organized under General Law pursuant to Section 59, of Article 16, of the Constitution of the State of Texas; provided that if the District requires the relocation, raising, lowering, rerouting, or change in grade or alteration in the construction of any railroad, transmission lines, conduits, poles, properties, or facilities, or pipelines in the exercise of the power of eminent domain or any other power, all of the relocation, raising, lowering, rerouting or changes in grade or alteration of construction shall be the sole expense of the District. The term 'sole expense' means the actual cost of relocation, raising, lowering, rerouting, or change in grade or alteration of construction to provide comparable replacement without enhancement of facilities, after deducting the net salvage value derived from the old facility;

"(p) to construct, extend, improve, maintain, and reconstruct, to cause to be constructed, extended, improved, maintained and reconstructed, and to use and operate, any and all facilities of any kind necessary or convenient to the exercise of such powers, rights, privileges and functions;

"(q) to sue and to be sued in its corporate name;

"(r) to adopt, use and alter a corporate seal;

"(s) to invest and re-invest its funds;

"(t) to make by-laws for the management and regulation of its affairs;

"(u) to appoint officers, agents, and employees, to prescribe their duties and to fix their compensation;

"(v) to make contracts and to execute instruments necessary or convenient to the exercise of the powers, rights, privileges, and functions conferred upon it by this Act or General Law for such term and with such provisions as the Board hereinafter referred to may determine to be in the best interests of the District, including, without in any way limiting the generality of the foregoing, contracts with persons, including the State of Texas, the United States of America and any corporation or agency thereof and districts, cities, towns, persons, organizations, associations, firms, corporations, entities or others, as such Board may deem necessary or proper for, or in connection with, any corporate purpose to provide for the construction, acquisition, ownership, financing, operation, maintenance, sale, leasing to or from, or other use or disposition of any facilities authorized to be developed, preserved, conserved, acquired, or constructed under this Act or General Law, including any improvements, structures, facilities, equipment and all other property of any kind in connection therewith and any lands, leaseholds, easements and any interests in any of the foregoing;

"(w) to authorize and allow any of such persons, including the State of Texas, the United States of America and any corporation or agency thereof and districts, agencies, cities, towns, persons, organizations, associations, firms, corporations, entities or others to participate with the District in the joint construction, acquisition, ownership, financing, operation, and maintenance of all of such improvements, structures, facilities, equipment and any other property in connection therewith, and all such lands, leaseholds, easements and interests therein as the Board hereinafter referred to may determine is necessary or proper for, or in connection with, any corporate purpose, and to allow such persons to receive such portion of the revenues derived therefrom as such Board shall deem just, equitable and proper;

"(x) to borrow money for its corporate purposes and, without limitation of the generality of the foregoing, to borrow money and accept grants from persons, including the State of Texas, the United States of America, or from any corporation or agency created or designated by the State of Texas or the United States of America, and, in connection with any such loan or grant, to enter into such agreements as the State of Texas or the United States of America or such corporations or agency may require; and to make and issue its negotiable bonds or notes for moneys borrowed, in the manner and to the extent provided in this Act, and to refund or refinance any outstanding bonds or notes and to make and issue its negotiable bonds or notes therefor in the manner and to the extent provided in this Act. Nothing in this Act shall authorize the issuance of any bonds, notes, or other evidences of indebtedness of the District, except as specifically provided in this Act, and no issuance of bonds, notes, or other evidences of indebtedness of the District shall ever be authorized except by this Act or General Law;

"(y) nothing herein shall be construed as conferring any water rights on the District, or as fixing any priority of rights, but said District shall obtain its water rights by application to and permit from the Texas Water Rights Commission as provided by General Statute; and nothing herein shall be construed as authorizing the District to make any regulation of the withdrawal of underground waters. To the extent the provisions of General Law which are adopted by reference in this Act may be in conflict with the express provisions of this Act, the provisions of this Act shall prevail unless the General Law is made cumulative. The rights, powers, privileges, authority, and functions granted to the District under this Act, and the District itself, are expressly subject to Chapters 5, 6, and 21, Water Code."

"Sec. 7. The domicile of the District shall be in the City of New Braunfels, County of Comal, where the District shall maintain an office, in charge of its General Manager. The District shall cause to be kept complete and accurate accounts conforming to approved methods of bookkeeping. Said accounts and all contracts, documents and records of the District shall be kept at an official office of the District. Said accounts and contracts shall be open to public inspection at all reasonable times. The Board shall cause to be made and completed within ninety (90) days after the end of each calendar year, an audit of the books of account and financial records of the District for such calendar year, such audit to be made by the State Auditor, an independent Certified Public Accountant or firm of Certified Public Accountants. Copies of a written report of such audit, certified to by said accountant or accountants, shall be placed and kept on file with the Texas Water Rights Commission, with the Treasurer of the State of Texas and at said official office, and shall be open to public inspection at all reasonable times."

"Sec. 9. The Board shall establish and collect rates and other charges for the sale or use of water, water connections, power, electric energy or all other services sold, furnished, or supplied by the District which fees and charges shall be reasonable and nondiscriminatory and sufficient to produce revenues adequate:

"(a) to pay all expenses necessary to the operation and maintenance and replacements and additions to the properties and facilities of the District;

"(b) to pay the interest on, the principal of and the premium, if any, on all bonds issued under this Act when and as the same shall become due and payable;

"(c) to pay all sinking fund and/or reserve fund payments agreed to be made in respect of any such bonds, and payable out of such revenues, when and as the same shall become due and payable;

"(d) to fulfill the terms of any agreements made with the holders of such bonds and/or with any person in their behalf; and

"(e) to discharge all other lawful obligations of the District as and when the same shall become due.

"(f) Of the revenues which may be received in excess of those required for the purposes specified in subparagraphs (a), (b), (c), and (e) above, the Board may in its discretion establish a reasonable depreciation and emergency fund, or retire (by purchase and cancellation or redemption) bonds issued under this Act, or apply the same to any corporate purpose.

"(g) It is the intention of this Act that the rates and charges of the District shall not be in excess of what may be necessary to fulfill the obligations imposed upon it by this Act. Nothing herein shall be construed as depriving the State of Texas of its power to regulate and control fees and/or charges to be collected for the use of water, water connections, power, electric energy, or other service, provided that the State of Texas does hereby pledge to and agree with the purchasers and successive holders of the bonds issued hereunder that the State will not limit or alter the power hereby vested in the District to establish and collect such fees and charges as will produce revenues sufficient to pay the items specified in subparagraphs (a), (b), (c), (d), and (e) of this Section 9, or in any way to impair the rights or remedies of the holders of the bonds, or of any person in their behalf, until the bonds, together with the interest thereon and any premium, with interest on unpaid installments of interest and all costs and expenses in connection with any action or proceedings by or on behalf of the bondholders and all other obligations of the District in connection with such bonds are fully met and discharged.

"(h) In the event the District enters into agreements to lease, sell or otherwise dispose of any property or facilities to any person, such person shall be subject to such regulations and control of fees and/or charges by the State of Texas as may be provided by agreement or General Law, but the Board shall fix payments under such leases or other contracts and agreements for the use or sale of any property in order that such payments, together with any other pledged revenues, will be sufficient to pay the interest on, the principal of and any premium on all bonds to which such payments are pledged when and as the same shall become due and payable; to pay all sinking fund and/or reserve fund payments agreed to be made in respect of any such bonds, and payable out of such payments, when and as the same shall become due and payable; and to fulfill the terms of any agreement made with the holders of such bonds and/or any person in their behalf and to discharge all other obligations of the District in connection with such bonds as and when the same shall become due."

"Sec. 11. The District shall have power and is hereby authorized to issue, from time to time, bonds or notes as herein authorized for any corporate purpose. Such bonds or notes (hereinafter called 'bonds') may either be (1) sold for cash, at public or private sale, at such price or prices as the Board shall determine, provided that the interest cost of the money received therefor, computed to maturity, shall not exceed ten (10) percent per annum, or (2) may be issued on such terms as the Board shall determine in exchange for property of any kind, real, personal or mixed or any interest therein which the Board shall deem necessary or convenient for any such corporate purpose, or (3) may be issued in exchange for like principal amounts of other obligations of the District, matured or unmatured. The proceeds of sale of such bonds shall be deposited in such bank or banks or trust company or trust companies, and shall be paid out pursuant to such terms and conditions, as may be agreed upon between the District and the purchasers of such bonds. All such bonds shall be authorized by resolution or resolutions of the Board concurred in by at least five (5) of the members thereof, and shall bear such date or dates, mature at such time or times, bear interest at such rate or rates which may be fixed, variable, floating or otherwise (not exceeding ten (10) per centum per annum), payable annually, semiannually or otherwise, be in such denominations, be in such form, either coupon or registered, carry such registration privileges as to principal only or as to both principal and interest, and as to exchange of coupon bonds for registered bonds or vice versa, and exchange of bonds of one denomination for bonds of other denominations, be executed in such manner and be payable at such place or places within or without the State of Texas as such resolution or resolutions may provide. Any resolution or resolutions authorizing any bonds may contain provisions, which shall be part of the contract between the District and the holders thereof from time to time.

"(a) Reserving the right to redeem such bonds or requiring the redemption of such bonds, at such time or times, in such amounts and at such prices, not exceeding one hundred and five per centum (105%) of the principal amount thereof, plus accrued interest, as may be provided;

"(b) Providing for the setting aside of sinking funds or reserve funds and the regulation and disposition thereof;

"(c) Pledging to secure the payment of the principal of and interest on such bonds and of the sinking fund or reserve fund payments agreed to be made in respect of such bonds all or any part of the gross or net revenues thereafter received by the District in respect of the property, real, personal or mixed, to be acquired and/or constructed with such bonds or the proceeds thereof, or all or any part of the gross or net revenues thereafter. received by the District from whatever source derived;

"(d) Prescribing the purposes to which such bonds or any bonds thereafter to be issued, or the proceeds thereof, may be applied;

"(e) Agreeing to fix and collect rates and charges sufficient to produce revenues adequate to pay the items specified in subdivisions (a), (b), (c), (d), and (e) of Section 9 hereof, and prescribing the use and disposition of all revenues;

"(f) Prescribing limitations upon the issuance of additional bonds and subordinate lien bonds and upon the agreements which may be made with the purchasers and successive holders thereof;

"(g) With regard to the construction, extension, improvement, reconstruction, operation, maintenance and repair of the properties of the District and carrying of insurance upon all or any part of said properties covering loss or damage or loss of use and occupancy resulting from specified risks;

"(h) Fixing the procedure, if any, by which, if the District shall so desire, the terms of any contract with the holders of such bonds may be amended or abrogated, the amount of bonds the holders of which must consent thereto, and the manner in which such consent may be given;

"(i) For the execution and delivery by the District to a bank or trust company authorized by law to accept trusts, or to the United States of America or any officer or agency thereof, or indentures and agreements for the benefit of the holders of such bonds setting forth any or all of the agreements herein authorized to be made with or for the benefit of the holders of such bonds and such other provisions as may be customary in such indentures or agreements; and

"(j) Such other provisions, not inconsistent with the provisions of this Act, as the Board may approve.

"(1) Any such resolution and any indenture or agreement entered into pursuant thereto may provide that in the event that:

"(a) default shall be made in the payment of the interest on any or all bonds when and as the same shall become due and payable, or;

"(b) default shall be made in the payment of the principal of any or all bonds when and as the same shall become due and payable, whether at the maturity thereof, by call for redemption or otherwise, or;

"(c) default shall be made in the performance of any agreement made with the purchasers or successive holders of any bonds;

"(2) And such default shall have continued such period, if any, as may be prescribed by said resolution in respect thereof, the trustee under the indenture or indentures entered into in respect of the bonds authorized thereby, or, if there shall be no such indenture, a trustee appointed in the manner provided in such resolution or resolutions by the holders of twenty-five per centum (25%) in aggregate principal amount of the bonds authorized thereby and at that time outstanding, and upon the written request of the holders of twenty-five per centum (25%) in aggregate principal amount of the bonds authorized by such resolution or resolutions at the time outstanding, shall, in his or its own name, but for the equal and proportionate benefit of the holders of all the such bonds; and with or without having possession thereof;

"(a) by mandamus or other suit, action or proceeding at law or in equity, enforce all rights of the holders of such bonds;

"(b) bring suit upon such bonds and/or the appurtenant coupons;

"(c) by action or suit in equity, require the District to account as if it were the trustee of an express trust for the bondholders;

"(d) by action or suit in equity, enjoin any acts or things which may be unlawful or in violation of the rights of the holders of such bonds, and/or;

"(e) after such notice to the District as such resolution may provide, declare the principal of all of such bonds due and payable, and if all defaults shall have been made good, then with the written consent of the holders of twenty-five (25) per centum in aggregate principal amount of such bonds at the time outstanding, annul such declaration and its consequences; provided, however, that the holders of more than a majority in principal amount of the bonds authorized thereby and at the time outstanding shall be instrument or instruments in writing delivered to such trustee have the right to direct and control any and all action taken or to be taken by such trustee under this paragraph. Any such resolution, indenture or agreement may provide that in any such suit, action, or proceeding, any such trustee, whether or not all of such bonds shall have been declared due and payable, and with or without possession of any thereof, shall be entitled as of right to the appointment of a receiver who may enter and take possession of all or any part of the properties of the District, and operate and maintain the same, and fix, collect, and receive rates and charges sufficient to provide revenues adequate to pay the items set forth in subparagraphs (a), (b), (c), (d) and (e) of Section 9 hereof and the costs and disbursements of such suit, action or proceeding, and to apply such revenues in conformity with the provisions of this Act and the resolution or resolutions authorizing such bonds. In any suit, action or proceeding by any such trustee, the reasonable fees, counsel fees and expenses of such trustee and of the receiver or receivers, if any, shall constitute taxable disbursements and all costs and disbursements allowed by the Court shall be a first charge upon any revenues pledged to secure the payment of such bonds. Subject to the provisions of the Constitution of the State of Texas, the courts of the County of Comal shall have jurisdiction of any suit, action or proceeding by any such trustee on behalf of the bondholders and of all property involved therein. In addition to the powers hereinabove specifically provided for, each such trustee shall have and possess all powers necessary or appropriate for the exercise of any thereof, or incident to the general representation of the bondholders in the enforcement of their rights.

"(3) Pending the issuance of definitive bonds, the District is authorized to make and issue interim bonds. The interim bonds so issued will be taken up with the proceeds of the definitive bonds, or the definitive bonds may be issued and delivered in exchange for and in substitution of such interim bonds. After any such exchange and substitution the District shall file proper certificates with the Comptroller of Public Accounts of the State of Texas as to such exchange, substitution and cancellation, and such certificates shall be recorded by the Comptroller of Public Accounts in the same manner as the record of proceedings authorizing the issuance of the bonds. The District is also authorized to make and issue temporary bonds for the purpose of interim financing and to make agreements or other provision to refinance such temporary bonds with bonds to provide permanent financing at such time, in such manner and on such conditions as may be determined by the Board.

"(4) Before any bonds shall be sold by the District, a certified copy of the proceedings for the issuance thereof, including the form of such bonds, together with any other information which the Attorney General of the State of Texas may require, shall be submitted to the Attorney General, and if he shall find that such bonds have been issued in accordance with law, and if he shall approve such bonds, he shall execute a certificate to that effect which shall be filed in the office of the Comptroller of the State of Texas and be recorded in a record kept for that purpose. No bonds shall be issued until the same shall have been registered by the Comptroller, who shall so register the same if the Attorney General shall have filed with the Comptroller his certificate approving the bonds and the proceedings for the issuance thereof as hereinabove provided.

"(5) All bonds approved by the Attorney General as aforesaid, and registered by the Comptroller as aforesaid, and issued in accordance with the proceedings so approved shall be valid and binding obligations of the District and shall be incontestable for any cause from and after the time of such registration.

"(6) If any bonds recite that they are secured by a pledge of the proceeds of a contract, lease, sale or other agreement (herein called 'contract'), a copy of such contract and the proceedings of the contracting parties will also be submitted to the Attorney General. If such bonds have been authorized and such contracts made in compliance with law, the Attorney General shall approve the bonds and contracts, and the bonds shall then be registered by the Comptroller of Public Accounts. When so approved, such bonds and the contracts shall be valid and binding and shall be incontestable for any cause from and after the time of such registration.

"(7) The District is authorized to make and issue bonds or notes (herein called 'refunding bonds') for the purpose of refunding or refinancing any outstanding bonds or notes authorized and issued by the District pursuant to this Act or other law (herein called 'bonds') and the interest and premium, if any, thereon to maturity or on any earlier redemption date specified in the resolution authorizing the issuance of the refunding bonds. Such refunding bonds may be issued to refund more than one series of outstanding bonds, may combine the pledges of the outstanding bonds for the security of the refunding bonds or may be secured by other or additional revenues. All provisions of this Act with reference to the issuance of bonds, the terms and provisions thereof, their approval by the Attorney General, and the remedies of the bondholders shall be applicable to refunding bonds. Refunding bonds shall be registered by the Comptroller upon surrender and cancellation of the bonds to be refunded, but in lieu thereof, the resolution authorizing the issuance of refunding bonds may provide that they shall be sold and the proceeds thereof deposited at the places at which the original bonds are payable. in which case the refunding bonds may be issued in an amount sufficient to pay the interest and premium, if any, on the original bonds to their maturity date or specified earlier redemption date. and the Comptroller will register them without concurrence. surrender and cancellation of the original bonds. The District may also refund any outstanding bonds in the manner provided by any applicable General Law."

"Sec. 12. All bonds issued by the District pursuant to the provisions of this Act shall constitute investment securities within the meaning of the Uniform Commercial Code."

"Sec. 13. The District may, but without intending by this provision to limit any powers of the District as granted to it by this Act, enter into and carry out such contracts, or establish or comply with such rules and regulations concerning labor and materials and other related matters in connection with any project or projects as the District may deem desirable or as may be requested by the State of Texas, the United States of America, or any corporation or agency created, designated or established thereby, which may assist in the financing of any such project or projects."

"Sec. 15. The District shall not prevent free public use of its surplus lands for recreation purposes and for hunting and fishing except at such point where, in the opinion of the Directors, such use would interfere with the proper conduct of the business."

"Sec. 16. All bonds and the interest thereon issued pursuant to the provisions of this Act shall be exempt from taxation (except inheritance taxes) by the State of Texas or by any municipal corporation, county or other political subdivision or taxing district of the State. All bonds of the District shall be and are hereby declared to be legal, eligible and authorized investments for banks, savings and loan associations, insurance companies, fiduciaries, trustees, guardians, and for the sinking funds of cities, towns, villages, counties, school districts, or other political corporations or subdivisions of the State of Texas. Such bonds shall be eligible to secure the deposit of any and all public funds of the State of Texas, cities, towns, villages, counties, school districts, or other political corporations or subdivisions of the State of Texas; and such bonds shall be lawful and sufficient security for said deposits to the extent of their face value, when accompanied by all unmatured coupons appurtenant thereto."

Sec. 2. It is determined and found that a proper and written notice of the intention to introduce this Act setting forth the general substance of this Act has been published at least 30 days and not more than 90 days prior to the introduction of this Act in the Legislature of Texas in a newspaper having a general circulation in the counties in which said district or part thereof is located; that a copy of such notice and a copy of this Act have been delivered to the Governor of Texas who has submitted such notice and Act to the Texas Water Rights Commission, and said Texas Water Rights Commission has filed is recommendations as to this Act with the governor, lieutenant governor and speaker of the house of representatives within 30 days from the date such notice and Act were received by the Texas Water Rights Commission; and that all the requirements and provisions of Article XVI, Section 59d, Constitution of the State of Texas, have been fulfilled and accomplished as herein provided, and that any applicable requirements and provisions of Article XVI, Section 59e, Constitution of the State of Texas, have been fulfilled and accomplished.

Sec. 3. This Act does not apply to or affect any litigation instituted prior to the effective date of this Act which questions the legality of any acts taken or proceedings had by the board or the district prior to said effective date.

Sec. 4. The importance of this legislation and the crowded condition of the calendars in both houses create an emergency and an imperative public necessity that the constitutional rule requiring bills to be read on three several days in each house be suspended, and this rule is hereby suspended, and that this Act take effect and be in force from and after its passage, and it is so enacted.

Passed the senate on May 8, 1975: Yeas 29, Nays 0; May 22, 1975, senate concurred in house amendment: Yeas 29, Nays 0; passed the house, with amendment, on May 21, 1975: Yeas 125, Nays 0, 2 present not voting.

Approved June 19, 1975.
Effective June 19, 1975.

VERNON'S ANNOTATED
REVISED CIVIL STATUTES
OF THE
STATE OF TEXAS

Volume 21A
WATER
Articles 8194 – 8280

Special Feature

THE TEXAS LAWS OF WATERS

By
HARBERT DAVENPORT
Attorney at Law, Brownsville

Volume 21, pp. XIII–XXXIX

Kept to Date by Cumulative Annual Pocket Parts

KANSAS CITY, MO.
VERNON LAW BOOK COMPANY

Art. 8280—106. Guadalupe-Blanco River Authority

Section 1. There is hereby created within the State of Texas, in addition to the Districts into which the State has heretofore been divided, a Conservation and Reclamation District to be known as "Guadalupe-Blanco River Authority" (hereinafter called the District) and consisting of that part of the State of Texas which is included within the boundaries of the Counties of Hays, Comal, Guadalupe, Caldwell, Gonzales, DeWitt, Victoria, Kendall, Refugio, and Calhoun. Such District shall be and is hereby declared to be a governmental agency and body politic and corporate, with the rights, privileges, and functions hereinafter specified, and the creation of such District is hereby determined to be essential to the accomplishment of the purposes of Section 59 of Article 16 of the Constitution of the State of Texas, including (to the extent hereinafter authorized) the control, storing, preservation and distribution of the waters of the Guadalupe and Blanco Rivers and their tributaries for irrigation, power, and other useful purposes, the reclamation and irrigation of arid, semi-arid and other lands needing irrigation, and the conservation and development of the forests, water and hydro-electric power of the State of Texas.

Nothing in this Act or in any other Act or law contained, however, shall be construed as authorizing the District to levy or collect taxes or assessments, or to create any indebtedness payable out of taxes or assessments, or in any way to pledge the credit of the State.

Sec. 2. Except as expressly limited by this Act, the District shall have and is hereby authorized to exercise all powers, rights, privileges, and functions conferred by General Law upon any District or Districts created pursuant to Section 59, of Article 16, of the Constitution of the State of Texas. Without limitation of the generality of the foregoing, the District shall have and is hereby authorized to exercise the following powers, rights, privileges, and functions;

(a) to control, store and preserve, within the boundaries of the District, the waters of the Guadalupe and Blanco Rivers and their tributaries for any useful purpose, and to use, distribute and sell the same, within the boundaries of the District, for any such purpose;

(b) to develop and generate water power and electric energy within the boundaries of the District and to distribute and sell water power and electric energy, within or without the boundaries of the District;

(c) to prevent or aid in the prevention of damage to person or property from the waters of the Guadalupe and Blanco Rivers and their tributaries;

(d) to forest and reforest and to aid in the foresting and reforesting of the watershed area of the Guadalupe and Blanco Rivers and their tributaries and to prevent and to aid in the prevention of soil erosion and floods within said watershed area;

(e) to acquire by purchase, lease, gift or in any other manner (otherwise than by condemnation) and to maintain, use and operate any and all property of any kind, real, personal, or mixed, or any interest therein, within or without the boundaries of the District, necessary or convenient to the exercise of the powers, rights, privileges and functions conferred upon it by this Act;

(f) to acquire by condemnation any and all property of any kind, real, personal or mixed, or any interest therein, within or without the boundaries of the District (other than such property or any interest therein without the boundaries of the District as may at the time be owned by any body politic) necessary or convenient to the exercise of the powers, rights, privileges, and functions conferred upon it by this Act, in the manner provided by General Law with respect to condemnation or, at the option of the District, in the manner provided by the Statutes relative to condemnation by Districts organized under General Law pursuant to Section 59, of Article 16, of the Constitution of the State of Texas;

(g) subject to the provisions of this Act from time to time sell or otherwise dispose of any property of any kind, real, personal, or mixed, or any interest therein, which shall not be necessary to the carrying on of the business of the District;

(h) to overflow and inundate any public lands and public property and to require the relocation of roads and highways in manner and to the extent permitted to Districts organized under General Law pursuant to Section 59, of Article 16, of the Constitution of the State of Texas;

(i) to construct, extend, improve, maintain, and reconstruct, to cause to be constructed, extended, improved, maintained and reconstructed, and to use and operate, any and all facilities of any kind necessary or convenient to the exercise of such powers, rights, privileges and functions;

(j) to sue and to be sued in its corporate name;

(k) to adopt, use and alter a corporate seal;

(*l*) to make by-laws for the management and regulation of its affairs;

(m) to appoint officers, agents, and employees, to prescribe their duties and to fix their compensation;

(n) to make contracts and to execute instruments necessary or convenient to the exercise of the powers, rights, privileges, and functions conferred upon it by this Act;

(*o*) to borrow money for its corporate purposes and, without limitation of the generality of the foregoing, to borrow money and accept grants from the United States of America, or from any corporation or agency created or designated by the United States of America, and, in connection with any such loan or grant, to enter into such agreements as the United States of America or such corporations or agency may require; and to make and issue its negotiable bonds for moneys borrowed, in the manner and to the extent provided in Section 10. Nothing in this Act shall authorize the issuance of any bonds, notes, or other evidences of indebtedness of the District, except as specifically provided in this Act, and no issuance of bonds, notes, or other evidences of indebtedness of the District, except as specifically provided in this Act, shall ever be authorized except by an Act of the Legislature;

(p) nothing herein shall be construed as conferring any water rights on the District, or as fixing any priority of rights, but said District shall obtain its water rights by application to and permit from the State Board of Water Engineers as provided by General Statute.

Sec. 3. The powers and duties herein devolved upon the said District shall be subject to the continuing rights of supervision by the State, which shall be exercised through the State Board of Water Engineers, and in appropriate instances, by the State Reclamation Engineer, each of which agencies shall be charged with the authority and duty to approve, or to refuse to approve, the adequacy of any plan or plans for flood control or conservation improvement purposes devised by the District for the achievement of the plans and purposes intended in the creation of the District, and which plans contemplate improvements supervised by the respective State authorities under the provisions of the General Law.

Sec. 4. The powers, rights, privileges and functions of the District shall be exercised by a board of nine (9) directors (herein called the Board), all of whom shall be residents of and freehold property taxpayers in the State of Texas. Said directors shall be appointed by the Governor from nominations furnished him by the Board of Water Engineers of the State of Texas, and the appointments confirmed by the Senate as in other cases of appointments by the Governor. Of the directors first appointed, three (3) shall hold office for a term expiring February 1, 1937, three (3) for a term expiring February 1, 1939, and three (3) for a term expiring February 1, 1941. Thereafter, directors shall hold office for a term of six (6) years.

Each director shall hold office until the expiration of the term for which he was appointed and thereafter, until his successor shall have been appointed and qualified unless sooner removed as in this Act provided. Any director may be removed by the authority which appointed him for inefficiency, neglect of duty or misconduct in office, after at least ten (10) days' written notice of the charge against him and an opportunity to be heard in person by counsel at public hearing. A vacancy resulting from the death, resignation or removal of any director shall be filled by the authority which appointed him for the unexpired term. Each director shall qualify by taking the official oath of office described by General Statute. It is provided, however, that the four directors of the present Guadalupe River Authority appointed by the Board of Water Engineers under the provisions of Chapter 75 of the Acts of the First Called Session of the Forty-third Legislature shall be, and they are hereby designated as members of the first board of nine (9) directors provided for in this Act, and the said four (4) directors, together with the remaining five (5) appointed in accordance herewith, shall, immediately after qualifying, draw for terms, and shall select a chairman from their number.

(a) Each director shall receive Ten Dollars ($10) per day for each day spent in attending meetings of the Board, and any other business of the District that the Board thinks necessary, plus actual traveling and other expenses.

(b) Until the adoption of by-laws fixing the time and place of regular meetings and the manner in which special meetings may be called, meetings of the Board shall be held at such times and places as five (5) of the directors may designate in writing. Five (5) directors shall constitute a quorum at any meeting and, except as otherwise provided, in this Act or in the by-laws, all action may be taken by the affirmative vote of a majority of the directors present at any such meeting, except that no contracts which involve any amount greater than Ten Thousand Dollars ($10,000) or which is to run for a period longer than a year, and no bonds, notes or other evidence of indebtedness and no amendment of the by-laws shall be valid unless authorized or ratified by the affirmative vote of at least five (5) directors.

Sec. 5. The Board shall select a Secretary who shall keep true and complete records of all proceedings of the Board. Until the appointment of a Secretary, or in the event of his absence or inability to act, a secretary pro tem shall be selected by the Board. The Board shall also select a General Manager, who shall be the chief executive officer of the District, and a treasurer. All such officers shall have such powers and duties, shall hold office for such term and be subject to removal in such manner as may be provided in the by-laws. The Board shall fix the compensation of such officers. The Board may appoint such officers, agents and employees, fix their compensation and term of office and the method by which they may be removed, and delegate to them such of its power and duties as it may deem proper.

Sec. 6. The moneys of the District shall be disbursed only on checks, drafts, orders or other instruments signed by such persons as shall be authorized to sign the same by the by-laws or resolution concurred in by not less than five (5) directors. The General Manager, the Treasurer and all other officers, agents and employees of the District who shall be charged with the collection, custody or payment of any funds of the District shall give bond conditioned on the faithful performance of their duties and an accounting for all funds and property of the District coming into their respective hands, each of which bonds shall be in form and amount and with a surety (which shall be a surety company authorized to do business in the State of Texas), approved by the Board, and the premiums on such bonds shall be paid by the District and charged as an operating expense.

Sec. 7. The domicile of the District shall be in the City of New Braunfels, County of Comal, where the District shall maintain its principal office, in charge of its General Manager. The District shall cause to be kept complete and accurate accounts conforming to approved methods of bookkeeping. Said accounts and all contracts, documents and records of the District shall be kept at said principal office. Said accounts and contracts shall be open to public inspection at all reasonable times. The Board shall cause to be made and completed within ninety (90) days after the end of each calendar year, an audit of the books of account and financial records of the District for such calendar year, such audit to be made by an independent Certified Public Accountant or firm of Certified Public Accountants. Copies of a written report of such audit, certified to by said accountant or accountants, shall be placed and kept on file with the Board of Water Engineers, with the Treasurer of the State of Texas and at said principal office, and shall be open to public inspection at all reasonable times.

Sec. 8. No director, officer, agent or employee of the District shall be directly or indirectly interested in any contract for the purchase of any property or construction of any work by or for the District, and if any such person shall be or become so interested in any such contract, he shall be guilty of a felony and on conviction thereof shall be subject to a fine in an amount not exceeding Ten Thousand Dollars ($10,000) or to confinement in the County jail for not less than one (1) year nor more than ten (10) years, or both.

Sec. 9. The Board shall establish and collect rates and other charges for the sale or use of water, water connections, power, electric energy or other services sold, furnished, or supplied by the District which fees and charges shall be reasonable and nondiscriminatory and sufficient to produce revenues adequate:

(a) to pay all expenses necessary to the operation and maintenance of the properties and facilities of the District;

(b) to pay the interest on and the principal of all bonds issued under this Act when and as the same shall become due and payable;

(c) to pay all sinking fund and/or reserve fund payments agreed to be made in respect of any such bonds, and payable out of such revenues, when and as the same shall become due and payable; and

(d) to fulfill the terms of any agreements made with the holders of such bonds and/or with any person in their behalf.

(e) out of the revenues which may be received in excess of those required for the purposes specified in subparagraphs (a), (b), (c), and (d) above, the Board may in its discretion establish a reasonable depreciation and emergency fund, or retire (by purchase and cancellation or redemption) bonds issued under this Act, or apply the same to any corporate purpose.

(f) It is the intention of this Act that the rates and charges of the District shall not be in excess of what may be necessary to fulfill the obligations imposed upon it by this Act. Nothing herein shall be construed as depriving the State of Texas of its power to regulate and control fees and/or charges to be collected for the use of water, water connections, power, electric energy, or other service, provided that the State of Texas does hereby pledge to and agree with the purchasers and successive holders of the bonds issued hereunder that the State will not limit or alter the power hereby vested in the District to establish and collect such fees and charges as will produce revenues sufficient to pay the items specified in subparagraphs (a), (b), (c), and (d) of this Section 9, or in any way to impair the rights or remedies of the holders of the bonds, or of any person in their behalf, until the bonds, together with the interest thereon, with interest on unpaid installments of interest and all costs and expenses in connection with any action or proceedings by or on behalf of the bondholders and all other obligations of the District in connection with such bonds are fully met and discharged.

Sec. 10. Any and every indebtedness, liability or obligation of the District, for the payment of money, however entered into or incurred, and whether arising from contract, implied contract or otherwise, shall be payable (1) out of the revenues received by the District in respect to its properties, subject to any prior lien thereon conferred by any resolution or resolutions theretofore adopted as in this Act provided, authorizing the issuance of bonds or (2), if the Board shall so determine, out of the proceeds of sale by the District of bonds payable solely from such revenues.

Sec. 11. The District shall have power and is hereby authorized to issue, from time to time, bonds as herein authorized for any corporate purpose. Such bonds may either be (1) sold for cash, at public or private sale, at such price or prices as the Board shall determine, provided that the interest cost of the money received therefor, computed to maturity in accordance with standard bond tables in general use by banks and insurance companies, shall not exceed six (6) per cent per annum, or (2) may be issued on such terms as the Board shall determine in exchange for property of any kind, real, personal or mixed or any interest therein which the Board shall deem necessary or convenient for any such corporate purpose, or (3) may be issued in exchange for like principal amounts of other obligations of the District, matured or unmatured. The proceeds of sale of such bonds shall be deposited in such bank or banks or trust company or trust companies, and shall be paid out pursuant to such terms and conditions, as may be agreed upon between the District and the purchasers of such bonds. All such bonds shall be authorized by resolution or resolutions of the Board concurred in by at least five (5) of the members thereof, and shall bear such date or dates, mature at such time or times, bear interest at such rate or rates (not exceeding six (6) per centum per annum), payable annually or semiannually, be in such denominations, be in such form, either coupon or registered, carry such registration privileges as to principal only or as to both principal and interest, and as to exchange or coupon bonds for registered bonds or vice versa, and exchange of bonds of one denomination for bonds of other denominations, be executed in such manner and be payable at such place or places within or without the State of Texas, as such resolution or resolutions may provide. Any resolution or resolutions authorizing any bonds may contain provisions, which shall be part of the contract between the District and the holders thereof from time to time.

(a) Reserving the right to redeem such bonds at such time or times, in such amounts and at such prices, not exceeding one hundred and five per centum (105%) of the principal amount thereof, plus accrued interest, as may be provided;

(b) Providing for the setting aside of sinking funds or reserve funds and the regulation and disposition thereof;

(c) Pledging to secure the payment of the principal of and interest on such bonds and of the sinking fund or reserve fund payments agreed to be made in respect of such bonds all or any part of the gross or net revenues thereafter received by the District in respect of the property, real, personal or mixed, to be acquired and/or constructed with such bonds or the proceeds thereof, or all or any part of the gross or net revenues thereafter, received by the District from whatever source derived;

(d) Prescribing the purposes to which such bonds or any bonds thereafter to be issued, or the proceeds thereof, may be applied;

(e) Agreeing to fix and collect rates and charges sufficient to produce revenues adequate to pay the items specified in subdivisions (a), (b), (c), and (d) of Section 9 hereof, and prescribing the use and disposition of all revenues;

(f) Prescribing limitations upon the issuance of additional bonds and upon the agreements which may be made with the purchasers and successive holders thereof;

(g) With regard to the construction, extension, improvement, reconstruction, operation, maintenance and repair of the properties of the District and carrying of insurance upon all or any part of said properties covering loss or damage or loss of use and occupancy resulting from specified risks;

(h) Fixing the procedure, if any, by which, if the District shall so desire, the terms of any contract with the holders of such bonds may be amended or abrogated, the amount of bonds the holders of which must consent thereto, and the manner in which such consent may be given;

(i) For the execution and delivery by the District to a bank or trust company authorized by law to accept trusts, or to the United States of America or any officer or agency thereof, or indentures and agreements for the benefit of the holders of such bonds setting forth any or all of the agreements herein authorized to be made with or for the benefit of the holders of such bonds and such other provisions as may be customary in such indentures or agreements; and

(j) Such other provisions, not inconsistent with the provisions of this Act, as the Board may approve.

(1) Any such resolution and any indenture or agreement entered into pursuant thereto may provide that in the event that:

(a) default shall be made in the payment of the interest on any or all bonds when and as the same shall become due and payable, or;

(b) default shall be made in the payment of the principal of any or all bonds when and as the same shall become due and payable, whether at the maturity thereof, by call for redemption or otherwise, or;

(c) default shall be made in the performance of any agreement made with the purchasers or successive holders of any bonds;

(2) And such default shall have continued such period, if any, as may be prescribed by said resolution in respect thereof, the trustee under the indenture or indentures entered into in respect of the bonds authorized thereby, or, if there shall be no such indenture, a trustee appointed in the manner provided in such resolution or resolutions by the holders of twenty-five per centum (25%) in aggregate principal amount of the bonds authorized thereby and at that time outstanding, and upon the written request of the holders of twenty-five per centum (25%) in aggregate principal amount of the bonds authorized by such resolution or resolutions at the time outstanding, shall, in his or its own name, but for the equal and proportionate benefit of the holders of all the such bonds; and with or without having possession thereof;

(a) by mandamus or other suit, action or proceeding at law or in equity, enforce all rights of the holders of such bonds;

(b) bring suit upon such bonds and/or the appurtenant coupons;

(c) by action or suit in equity, require the District to account as if it were the trustee of an express trust for the bondholders;

(d) by action or suit in equity, enjoin any acts or things which may be unlawful or in violation of the rights of the holders of such bonds, and/or;

(e) after such notice to the District as such resolution may provide, declare the principal of all of such bonds due and payable, and if all defaults shall have been made good, then with the written consent of the holders of twenty-five (25) per centum in aggregate principal amount of such bonds at the time outstanding, annul such declaration and its consequences; provided, however, that the holders of more than a majority in principal amount of the bonds authorized thereby and at the time outstanding shall be instrument or instruments in writing delivered to such trustee have the right to direct and control any and all action taken or to be taken by such trustee under this paragraph. Any such resolution, indenture or agreement may provide that in any such suit, action, or proceeding, any such trustee, whether or not all of such bonds shall have been declared due and payable, and with or without possession of any thereof, shall be entitled as of right to the appointment of a receiver who may enter and take possession of all or any part of the properties of the District, and operate and maintain the same, and fix, collect, and receive rates and charges sufficient to provide revenues adequate to pay the items set forth in subparagraphs (a), (b), (c), and (d) of Section 9 hereof and the costs and disbursements of such suit, action or proceeding, and to apply such revenues in conformity with the provisions of this Act and the resolution or resolutions authorizing such bonds. In any suit, action or proceeding by any such trustee, the reasonable fees, counsel fees and expenses of such trustee and of the receiver or receivers, if any, shall constitute taxable disbursements and all costs and disbursements allowed by the Court shall be a first charge upon any revenues pledged to secure the payment of such bonds. Subject to the provisions of the Constitution of the State of Texas, the courts of the County of Comal shall have jurisdiction of any suit, action or proceeding by any such trustee on behalf of the bondholders and of all property involved therein. In addition to the powers hereinabove specifically provided for, each such trustee shall have and possess all powers necessary or appropriated for the exercise of any thereof, or incident to the general representation of the bondholders in the enforcement of their rights.

(3) Before any bonds shall be sold by the District, a certified copy of the proceedings for the issuance thereof, including the form of such bonds, together with any other information which the Attor-

ney General of the State of Texas may require, shall be submitted to the Attorney General, and if he shall find that such bonds have been issued in accordance with law, and if he shall approve such bonds, he shall execute a certificate to that effect which shall be filed in the office of the Comptroller of the State of Texas and be recorded in a record kept for that purpose. No bonds shall be issued until the same shall have been registered by the Comptroller, who shall so register the same if the Attorney General shall have filed with the Comptroller his certificate approving the bonds and the proceedings for the issuance thereof as hereinabove provided.

(4) All bonds approved by the Attorney General as aforesaid, and registered by the Comptroller as aforesaid, and issued in accordance with the proceedings so approved shall be valid and binding obligations of the District and shall be incontestable for any cause from and after the time of such registration.

Sec. 12. All bonds issued by the District pursuant to the provisions of this Act shall constitute negotiable instruments within the meaning of the Negotiable Instruments Law [1].

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[1] Article 5932 et seq.

Sec. 13. The District may, but without intending by this provision to limit any powers of the District as granted to it by this Act, enter into and carry out such contracts, or establish or comply with such rules and regulations concerning labor and materials and other related matters in connection with any project or projects as the District may deem desirable or as may be requested by the United States of America, or any corporation or agency created, designated or established thereby, which may assist in the financing of any such project or projects.

Sec. 14. The District shall have power out of any funds available therefor to purchase any bonds issued by it at a price not exceeding the redemption price applicable at the time of such purchase, or if such bonds shall not be redeemable, at a price not exceeding the principal amount thereof plus accrued interest. All bonds so purchased shall be cancelled and no bonds shall ever be issued in lieu thereof.

Sec. 15. The District shall not prevent free public use of its lands for recreation purposes and for hunting and fishing except at such point where, in the opinion of the Directors, such use would interfere with the proper conduct of the business.

Sec. 16. All bonds and the interest thereon issued pursuant to the provisions of this Act shall be exempt from taxation (except inheritance taxes) by the State of Texas or by any municipal corporation, county or other political subdivision or taxing district of the State.

Sec. 17. This Act without reference to other Statutes of the State of Texas, shall constitute full authority for the authorization and issuance of bonds hereunder and no other Act or law with regard to the authorization or issuance of obligations or the deposit of the proceeds thereof, or in any way impeding or restricting the carrying out of the Acts herein authorized to be done shall be construed as applying to any proceedings taken hereunder or Acts done pursuant hereto.

Sec. 18. This Act and all of the terms and provisions hereof shall be liberally construed to effectuate the purposes set forth herein.

Sec. 19. There is hereby appropriated for the use of the District out of any funds in the State Treasury not heretofore otherwise appropriated the sum of Five Thousand Dollars ($5,000) which may be withdrawn from time to time on warrant signed by the General Manager and Treasurer of the District. Provided however, that this money shall be repaid the State of Texas.

Sec. 20. If any provision of this Act or the application thereof to any person or circumstance shall be held to be invalid, the remainder of the Act, and the application of such provision to other persons or circumstances, shall not be affected thereby.

Sec. 21. This Act shall not have the effect of repealing the Act passed by the Forty-third Legislature at its First Called Session, being Chapter 75 of said Acts, but the Guadalupe River Authority, a conservation and reclamation district created by virtue thereof, shall continue with all the powers, rights and duties conferred by said Act; provided, however, that said Guadalupe River Authority may, by resolution of its board of directors, dissolve and merge with the district hereby created.

Sec. 22. This Act may be cited as the Guadalupe-Blanco River Authority Act. Acts 1933, 43rd Leg., 1st C.S., p. 198, ch. 75; Acts 1935, 44th Leg., 1st C.S., p. 1615, ch. 410, § 1.

Notes of Decisions

1. In general

Whether city should have leased part of its utility property to conservation and reclamation district was a matter addressed to discretion of mayor and city commissioners, and was not an issue for court in suit to enjoin lessee from interfering with city agency's possession of plan on ground of invalidity of lease. Guadalupe-Blanco River Authority v. Tuttle, Board of Trustees, Civ.App., 171 S.W.2d 520.

The lease of a steam operated electric generating plant by river authority to supplement its hydro-electric plants was not ultra vires, where authority was created for conservation and development of water and hydro-electric power with authority to acquire, maintain, use and operate "all property of any kind necessary or convenient" to exercise of its powers and in view of authority under art. 7807d to buy, own and operate "power plants". Guadalupe-Blanco River Authority v. City of San Antonio, 145 T. 611, 200 S.W.2d 989.

Where lease contract which city was required to recognize in order to assert its right to acquire electric system placed management of leased property in hands of lessee, whatever statutory right city had to have its board of trustees manage light system was subject to prior right of lessee to manage leased property. Id.

Where engineer, who allegedly misrepresented to city that execution of lease contract to river authority with respect to a certain electric generating plant would be to city's advantage, was an employee of firm of investment bankers, who had purchased bonds issued by city to acquire electric system, and not an employee of river authority, and river authority was not responsible for engineer's statements, and, in any event, city did not rely on engineer's statements, which were mere estimates of earnings based on past performance, river authority was not chargeable with fraud by reason of engineer's statements. Id.

The Edwards Aquifer

Underground River of Texas

GBRA

GUADALUPE-BLANCO RIVER AUTHORI

Introduction

The Multiple Watersheds of the Guadalupe River — Section I

The Edwards Connection — Section II

The State of Texas Owns the Waters in the Edwards Aquifer in Trust for the Benefit of the Public — Section III

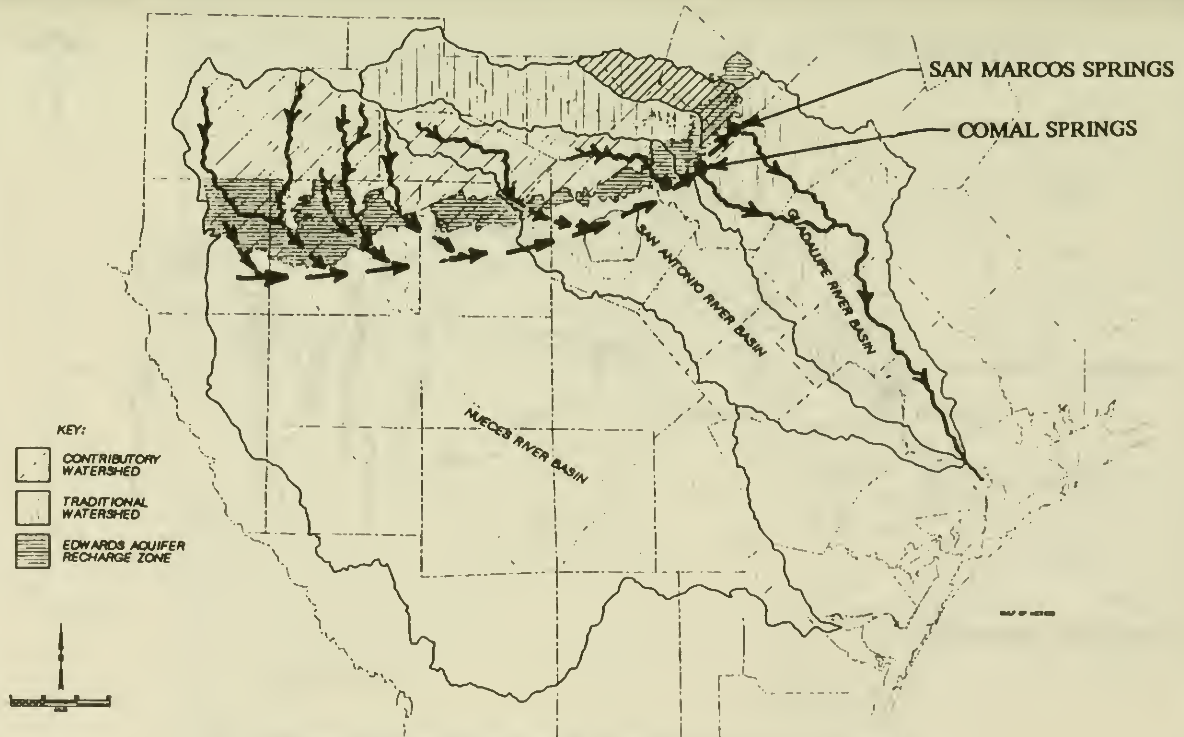
Conjunctive Regulation of the Edwards and Connected Surface Streams – A Crucial Step Toward Solving the Regional Water Problem — Section IV

Appendices

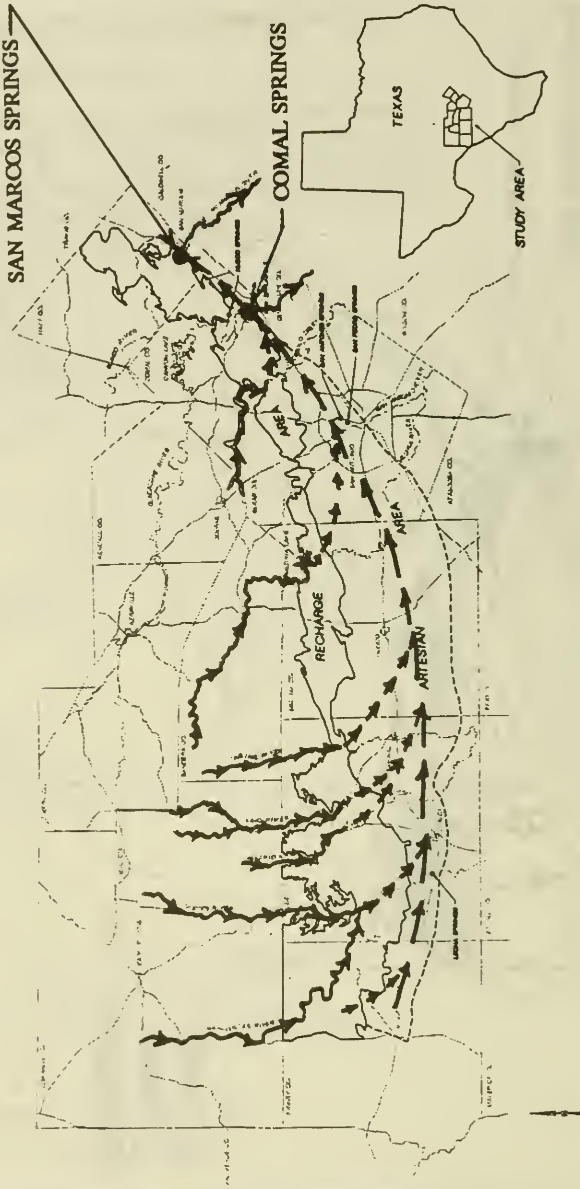
Bibliography

Biography of the Authors

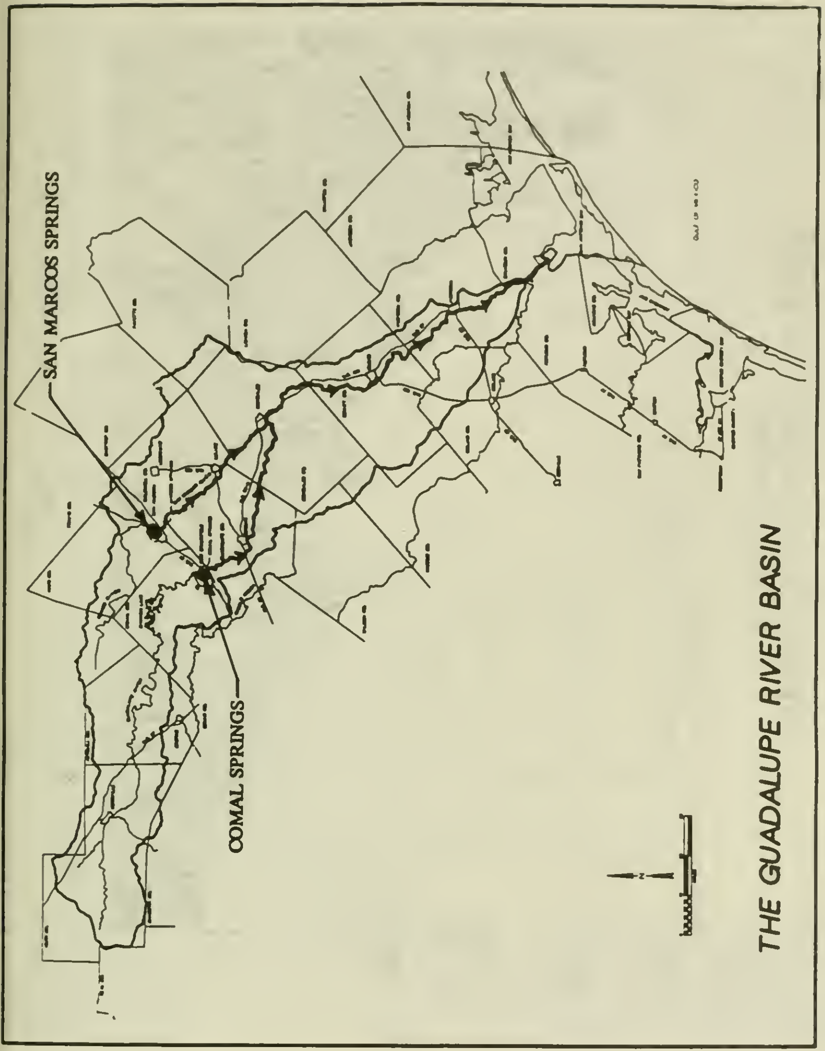
April 1988



THE SURFACE-SUBSURFACE-SURFACE STREAM SYSTEM



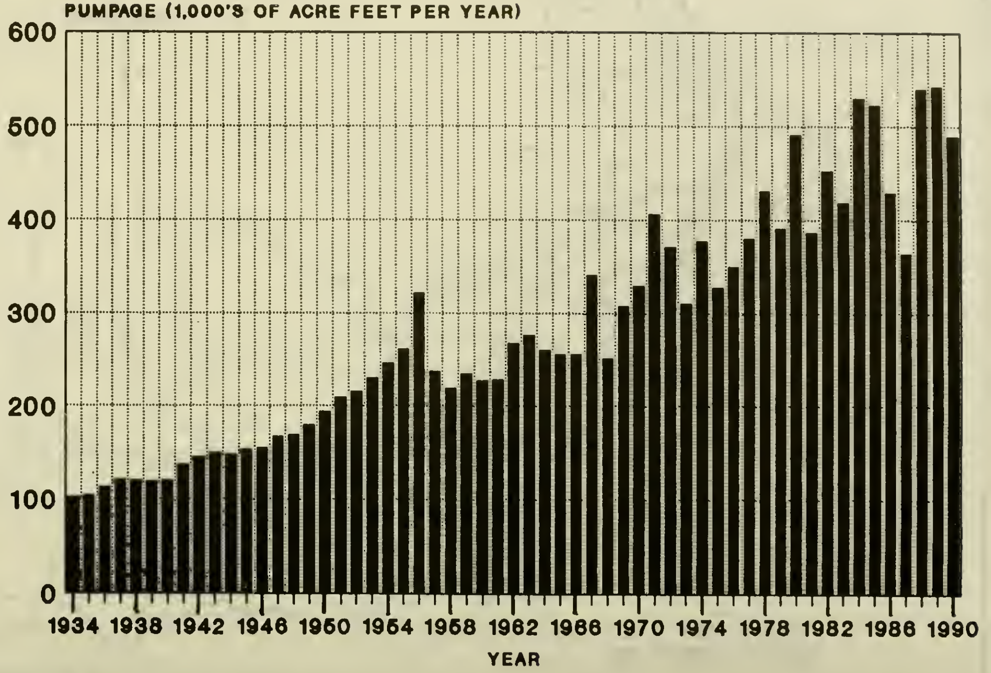
EDWARDS (BALCONES FAULT ZONE) AQUIFER, SAN ANTONIO REGION



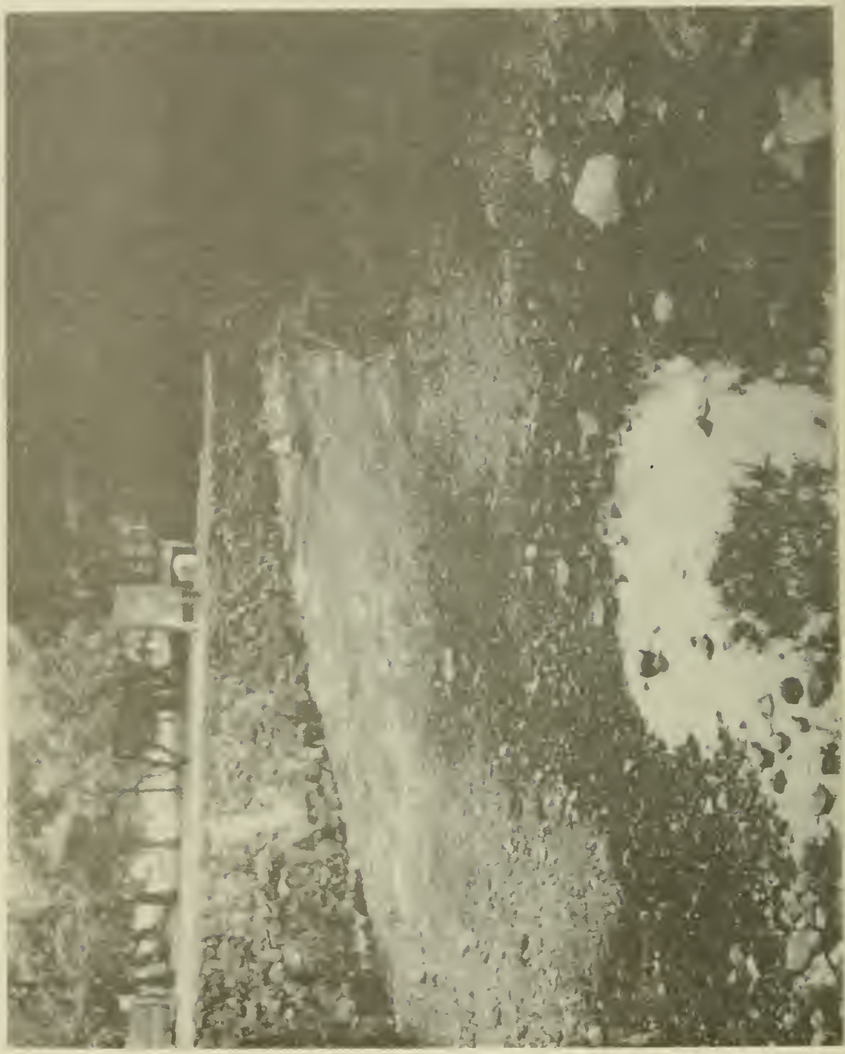
THE GUADALUPE RIVER BASIN

EDWARDS AQUIFER PUMPAGE

1934-1990



SOURCE: BULLETIN 60, EUWD.



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DEPUTY

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

GUADALUPE BLANCO RIVER AUTHORITY,	§ § §	
VS.	§	CIVIL NO. A-89-CA-771
CITY OF LYTLE, ET AL,	§ §	

ORDER

Before the Court are numerous Motions filed in this case involving removal, remand, abstention or dismissal,[1] and responses filed by the Plaintiff. Due to the complexity of this case, the number of parties and degree of expense involved, and the extreme importance of the subject matter of this lawsuit to the public the Court has sought to resolve the difficult jurisdictional issues raised in an expeditious manner. Upon review of the motions, responses, pleadings, and other documents filed the Court finds that it should abstain from hearing the merits of this case, and REMAND the cause to the District Court of Hays County, 22nd Judicial District, from which it was removed.

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[1] Among the parties who filed such motions are the Federal Defendants, McFadin et al, the City of Uvalde, the City of Lytle, the San Antonio Parties, the City of New Braunfels, Celotex corp. and others.

REMOVAL UNDER SECTION 1442

The Federal Defendants[2] filed a Notice for Removal of this case on August 17, 1989 pursuant to 28 U.S.C. § 1442(a)(1). Motions have been filed objecting to the propriety of this removal. The removal provision at issue provides:

> A civil or criminal prosecution commenced in a State court against any of the following persons may be removed by them to the district court of the United States for the district and division embracing the place wherein it is pending:
>
> (1) Any officer of the United States or any agency thereof, or person acting under him, for any act under color of such office or on account of any right, title or authority claimed under any Act of Congress for the apprehension or punishment of criminals or the collection of the revenue (emphasis added).

28 U.S.C. § 1442(a)(1). The Fifth Circuit has broadly interpreted section 1442 to confer jurisdiction to federal courts over claims brought against a federal officer or agency. IMFC Professional Services of Florida, Inc. v. Latin American Home Health, Inc., 676 F.2d 153, 156 (5th Cir. 1982).

The United States Supreme Court recently set forth its interpretation of section 1442 in Mesa v. California, __U.S.__ , 109 S.Ct 959 , __L.Ed2d.__ (1989). Mesa involved the removal of criminal prosection brought against two postal workers in state court. The workers were charged with various traffic violations committed while operating a postal vehicle. Mesa at 961. The

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[2] United States Departments of the Army and the Air Force.

Court stated that the purpose of section 1442 is to protect federal officials from being prosecuted in state court as the result of exercising some duty under federal law. Under the "federal defense" requirement, the official or agency is entitled to a federal forum to ensure its ability to defend its actions by showing that it was performing its duty under color of federal law. Mesa at 967. In order for removal under section 1442 to be permitted there must be a federal defense raised which justifies resolution in a federal forum. Mesa at 967-969.

It is clear that removal pursuant to section 1442 was proper in the present case. The Federal Defendants were joined in this cause because they are the owners and operators of several water wells which tap into the Edwards Aquifer. These wells supply water for military installations operated pursuant to the laws of the United States. Subsequent to removal, the federal defendants filed a Motion to Dismiss asserting the federal defense of sovereign immunity. The Court finds that the requirements for removal under section 1442 have been met.

THE SOVEREIGN IMMUNITY DEFENSE

On October 10, 1989 the Federal Defendants filed a Motion to Dismiss or in the Alternative Motion to Dismiss the Federal Defendants as parties. GBRA filed a response to the sovereign immunity claim on November 17, 1989. For reasons discussed infra, the Court elects to rule on the Federal Defendant's motion in part, ruling solely on the defense of sovereign immunity. Upon review of the motions, responses, and pleadings filed the Court finds that the Federal Defendant's sovereign immunity claim is without merit and that their request for dismissal as parties on that basis should be DENIED.

It is well-settled that the United States, as sovereign, is immune from suit unless it consents to be sued. United States v. Sherwood, 312 U.S. 584, 586 (1981); United States v. Mitchell, 445 U.S. 535, 538 (1980). In the present case the Court finds that the United States has consented to be sued in cases involving the adjudication of water rights. Consent is evidenced by the McCarran Amendment, 43 U.S.C. § 666 which provides in relevant part:

> Consent is hereby given to join the United States as a defendant in any suit (1) for the adjudication of rights to the use of water of a river system or other source (emphasis added).

The Court is not persuaded by the Federal Defendant's argument that the United States may only be joined pursuant to 43 U.S.C. § 666 where the suit involves adjudications covering an entire river system including its tributaries. On the contrary, the Court finds that the facts presented in this case fall well within the scope of the McCarran Amendment.

Cases cited by the Federal Defendants actually support a finding that consent under the McCarran Amendment is applicable in the present case. In United States v. District Court in and for the County of Eagle, 401 U.S. 520 (1971) the United States Supreme

Court rejected as "almost frivolous" the argument that the United States was immune from being joined in the adjudication of water rights to a tributary of the Colorado River merely because the rights to the entire Colorado River System were not being adjudicated in the proceeding. Eagle at 523. Rather, the Supreme Court held the McCarran Amendment to be all-inclusive, providing for consent to join the United States in the general adjudication of all types of water rights. Id. at 523-525.

The Supreme Court's holding in Eagle indicates that the scope of the McCarran Amendment is not defined by the geological expanse of the water body at issue, but whether the adjudication is "general" in that it seeks to determine the rights of.all claimants to the water. This view is consonant with the primary purpose of 43 U.S.C. § 666 as stated by its author.

> [the amendment] is not intended to be used for any other purpose than to allow the United States to be joined in a suit wherein it is necessary to adjudicate all of the rights of various owners on a given stream. This is so because unless all of the parties owning or in the process of acquiring rights on a particular stream can be joined as parties defendant, any subsequent decree would be of little value.

Eagle at 1002, quoting S.Rep.No. 755, 82d Cong., 1st Sess., 9.

The complaint filed by GBRA seeks, among other things, an initial declaration that title to water in the Edwards Aquifer is privately or publicly held. It is conceivable that all rights to water in the Edwards could be affected by this lawsuit should this case progress to some declaration of ownership by a state court.

The argument that this cause is not a "general adjudication" as contemplated by 43 U.S.C. § 666 because of the failure to join all owners of land situated above the aquifer is without merit at this stage of the litigation. In the companion case to Eagle, the Supreme Court held that the "general adjudication" considered in 43 U.S.C. § 666 does not require the simultaneous determination of all claims to the water in question. United States v. District Court in and for Water Division No. 5, 401 U.S. 527 (1971). It is enough that all rights in question will be reached "inclusively in the totality," and that all claimants will be reached over time. Id. at 530.[3] At least one Circuit Court has held that failure to initially join all claimants in the proceeding does not defeat the McCarran Amendment's waiver of sovereign immunity. United States v. Bluewater-Toltec Irrigation Dist., 580 F.Supp. 1434, 1438 (D. N.M. 1984); aff'd 806 F.2d 986 (10th Cir. 1986).

As supported by the foregoing discussion the Court finds that the United states has waived the defense of sovereign immunity in the present case. The result of such waiver is that a state court's jurisdiction over the Federal Defendants is as effective as this Court's, so that any judgment that might be rendered will be equally enforceable. In light of the state's concurrent jurisdiction, and for the reasons detailed infra, the Court finds that resolution of this matter in state court is appropriate.

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[3] In Water Division No. 5. the Department of the Navy was joined among other United States Parties in the adjudication of the water rights to the entire Colorado River Basin situated in the state of Colorado. The Navy's interest did not involve current use, as in the present case, but the potential need for water should certain federal oil and gas reserves in the region be developed in the future. While the apportionment of rights to water in the Edwards Aquifer by a court in this case is conditioned upon certain preliminary findings, the potential that rights could collide or otherwise be affected is certainly no more distant than the position of the Navy in Water District No. 5.

ABSTENTION

The Court is fully aware that "abstention from exercise of federal jurisdiction is the exception, not the rule." Moses H. Cone Hospital v. Mercury Const. Corp., 460 U.S. 1 (1983) (quoting Colorado River Water Conservation District v. United States, 424 U.S. 800, 813 (1976)). Viewing this case in the context of the dynamics of water rights adjudication in Texas, the elaborate state regulatory systems in place to deal with these issues[4], and the potential ramifications this litigation presents in affecting public policy of substantial state concern, it is evident that abstention as conceived in Burford v. Sun Oil, 319 U.S. 315 (1953) is mandated.

In Burford a Federal District Court was confronted with a Fourteenth Amendment challenge to the reasonableness of the Texas Railroad Commission's grant of an oil drilling permit. The federal

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[4] The Court notes that several parties have made persuasive arguments that this case should be dismissed on the merits for lack of justiciability. Motions have been filed urging the Court to dismiss the case for lack of actual controversy, or alternatively that the issues presented involve political questions delegated to the Texas Legislature. In deciding to abstain from exercising its jurisdiction, the Court finds ruling on the justiciability questions unnecessary.

Constitutional challenge was of minimal importance, since the case dealt primarily with the interpretation of state oil and gas law by the Texas Railroad Commission. Burford at 331. The Supreme Court found that Texas had created an elaborate regulatory system which provided for judicial review of Commission orders, and that " a sound respect for independence of state action requir[ed] the federal equity court to stay its hand". Id. at 334.

In a recent discussion of the doctrine the Supreme Court indicated that Burford abstention is not limited to the appellate review of state regulatory orders by Federal Courts. New Orleans Public Service, Inc. v. Council of City of New Orleans, __.U.S.__, 109 S.Ct. 2506, __L.Ed.2d__, (1989). In New Orleans, the principle established in Burford and developed in subsequent cases is as follows:

> Where timely and adequate state court review is available, a federal court sitting in equity must decline to interfere with the proceedings or orders of state administrative agencies: (1) when there are 'difficult questions of state law bearing on policy problems of substantial public import whose importance transcends the result in the case at bar'; or (2) where the 'exercise of federal review of the question in the case and in similar cases would be disruptive of state efforts to establish a coherent policy with respect to a matter of substantial public concern.

New Orleans at 2514 (quoting Colorado River Water Conservation Dist. v. United States, 424 U.S. 800, 814 (1976)).

In the present case Plaintiffs argue that they are entitled to a determination by the Court of the title to water in the

Edwards Aquifer. What is not clear, however, is whether this determination is postured as judicial review of proceedings or orders, implied or express, promulgated by the Texas Legislature, the Texas Water Commission, or the Edwards Underground Water District, or whether this is initially a pure declaratory judgment action. Arguments have been made by both sides, but none are entirely persuasive. The question of what role this lawsuit plays in the scheme of water rights adjudications in Texas indicates at the outset that a state court is best-suited to make this determination.

Deference to the state court is consonant with the basic aim of Burford abstention. It is evident that state agencies have promulgated regulations involving the Edwards Aquifer[5], while it is not clear that a state court has ruled or should rule on the validity or efficacy of those orders. An attempt by this Court to unravel the state's efforts in regulating the Edwards Aquifer could alone disrupt what cohesive policy exists in a difficult area of Texas law.

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[5] The Texas Water Commission is the primary state agency charged with regulation of the state's water resources. Tex. Water Code Ann §5.002 et seq. The Edwards Underground Water District (EUWD) was specifically created to manage the water resources located in the aquifer. Tex. Rev. Stat. Ann. art. 8280-219, §1 (Vernon 1959) The legislature has repeatedly modified the scope of authority delegated to the EUWD. Act of June 6, 1979, ch. 306, § 1, 1979 Tex. Gen. Laws 706; Act of June 19, 1983, ch. 1010, §1, 1983 Tex. Gen. Laws 5422; Act of June 11, 1987, ch. 333, §1 1987 Tex. Gen. Laws 1747; Act of June 18, 1987, ch. 629, §1 1987 Tex. Gen. Laws 2411.; Act of June 14, 1989, ch. 599, § 1989 Tex. Sess. Law Serv. 1988 (Vernon).

Paramount among the purposes of Burford abstention is the notion that States be granted latitude in the formulation of regulations involving substantial public importance. New Orleans at 2514-2515. There can be no greater matter of public concern to a state government than providing for the definite availability of potable water to its citizens. State regulations and laws must be allowed to operate without federal court interference; especially, as in the present case, where the federal interests do not present unique issues which merit a federal forum, but are at par with the interests of state claimants. Kaiser Steel Corp. v. W.S. Ranch, 391 U.S. 593 (1968).[6]

The Court finds that abstention under Burford is warranted. It is clear that the regulation of water in the Edwards Aquifer involves problems of substantial public importance that transcend the result of the present case. At issue is a state's hegemony to provide water for its citizens by formulating cohesive policies to effectuate that goal. It is also apparent that the state has acted in an attempt to provide for cohesive regulation through the creation of a Water Commission and the specific creation of a regulatory body that deals solely with the administration of the Edwards Aquifer. Such regulation is an ongoing process, as evidenced by the recent adoption by the Texas Legislature of HB 42 authorizing the EUWD to implement drought management regulations. Act of June 18, 1987, ch. 629 § 1, 1987 Tex. Gen. Laws 2411. Any involvement by this Court through the exercise of its jurisdiction in this case could be detrimental to the state's ongoing regulatory efforts and would be contrary to years of established federal jurisprudence in which federal courts have abstained where judicial review would have a disruptive effect on those efforts.

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[6] In Kaiser the Supreme Court reversed the 10th Circuit and ordered that it abstain pending resolution of the dispute in state court. Id. at 594. The Court noted that resolution of disputes involving water in an arid region is of vital state concern, amounting to a 'special circumstance' which justified the imposition of abstention. Id.

JUSTICIABILITY

While the Court's decision is based on principles of abstention, the strong arguments made to dismiss this case for lack of justiciability merit discussion. Some have argued for dismissal for failure to present an actual case or controversy. The argument holds that the Edwards Aquifer cannot be declared an underground river by definition according to settled Texas law. Alternatively, it is argued that the Edwards has been determined to be an underground reservoir, not an underground stream, as implied by the actions of the Texas Legislature in creating the Edwards Underground Water District.[7] Whether such determination, if made, by the legislature precludes the present suit involves the very interpretation of the state regulatory system from which the Court chooses to abstain.

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[7] The argument is that the Texas Water Code authorizes creation of underground water districts solely "to provide for the conservation, preservation, protection, recharging and prevention of waste of the underground water of underground water reservoirs or their subdivisions ... ." (emphasis added) Tex. Water Code Ann. §52.021 (Vernon Supp. 1989). Other provisions of the Water Code expressly state that underground water is not subject to administration by the Water Commission. Tex. Water Code Ann.§§ 11.339, 52.003. (Vernon Supp. 1989) The implication is that the creation of an underground water district to administer the Edwards Aquifer amounts to a finding that it is not an underground river.

Most persuasive is the argument that this cause of action presents a "political question" which has been relegated to the Texas Legislature for decision. A case involving a political question can be found where there is " a textually demonstrable constitutional commitment of the issue to a coordinate political department ... or the impossibility of a court's undertaking independent resolution without expressing lack of respect due coordinate branches of government . . .". Baker v. Carr, 369 U.S. 186, 217 (1962); Texas Association of Concerned Taxpayers v. United States, 772 F.2d 163, 165 (5th Cir. 1985) rehearing denied 776 F.2d 1048, cert. denied, 476 U.S. 1151. Proponents of the "political question" argument proclaim that the Texas Constitution evidences a textually demonstrable commitment vesting authority in the Texas Legislature to formulate policy for the state's water resources. TEX. CONST. Art. XVI, § 59. Pursuant to this commitment, the legislature promulgated the Texas Water Code and delegated its responsibility for managing water resources to the Texas Water Commission. TEX. WATER CODE ANN. § 5.012 (Vernon 1988). In turn, the Texas Legislature created the EUWD in order to manage the Edwards Aquifer with a specific body created solely for that purpose. TEX. REV. STAT. ANN. art. 8280-219, § 1 (Vernon 1959), Act of April 28, 1959, ch. 99, § 1, 1959 Tex. Gen. Laws 173. The Legislature has continued to refine and expand the powers of the

EUWD up to its most current expression in H.B. 1942. Act of June 18, 1987, ch. 629 § 11, 1987 Tex. Gen. Laws 2411.

H.B. 1942 authorized the EUWD to develop a "Drought Management Plan" to protect the water table in the aquifer during arid times. A plan was approved and adopted by the EUWD on August 23, 1988. The protection of Comal Springs and San Marcos Springs is listed as a goal of the plan as adopted. Edwards Underground Water District Drought Management Plan, Chap. 1, p. 1-1 (1988). The plan, however, does not indicate that measures will be taken to prevent Comal Springs from going dry in times of drought, but merely states a general policy that the length of time Comal Springs is allowed to remain dry should be minimized. Id. This policy declaration is at odds with one of Plaintiff's claims for relief as stated in its complaint, the unqualified protection of Comal Springs. Plaintiff's Original Petition p. 13 paragraph 21. The Legislature has apparently provided for administrative and judicial review of rules adopted by EUWD. TEX. REV. CIV. STAT. ANN. art. 8280-219, §§ 3(c-e). The issue is whether pursuit of this claim through avenues other than those designated by the Texas Legislature presents a political question. For the reasons set forth in this order, the Court defers to the wisdom of the state court for resolution of the justiciability issue as it may be presented in that jurisdiction.

ACCORDINGLY, this Court abstains from exercising jurisdiction, and IT IS ORDERED that this cause be REMANDED to the 22nd Judicial District of Hays County, Texas.

IT IS FURTHER ORDERED that the Federal Defendant's Motion For Dismissal as Parties is DENIED.

IT IS FURTHER ORDERED that the Special Master appointed by the Court be released from further duties in this cause and that, after payment of those fees due and owing to said Special Master, any balance of funds remaining in the Court's Registry for such payments be refunded to Plaintiff.

SIGNED AND ENTERED this 22nd day of November, 1989.

JAMES R. NOWLIN
UNITED STATES DISTRICT JUDGE

FILED

AUG 29 1991

U. S. DISTRICT COURT
CLERK'S OFFICE
By ____ Deputy

UNITED STATES COURT OF APPEALS

FOR THE FIFTH CIRCUIT

U.S. COURT OF APPE
FILED
AUG 02 1991
GILBERT F. GANUCHEAU
CLERK

No. 90-8064

D.C. Docket No. A 89 CA 771

GUADALUPE-BLANCO RIVER
AUTHORITY, Etc.,
Plaintiff,

v.

CITY OF LYTLE, Et Al., Defendants.

UNITED STATES DEPARTMENTS OF
the ARMY AND AIR FORCE,
Defendants-Appellants,

and

The San Antonio Parties,
Intervenor-Appellant,

v.

GUADALUPE-BLANCO RIVER
AUTHORITY, Etc., Plaintiff-
Appellee,

and

City of San Marcos; City of New Braunfels and New Braunfels Utilities; Danny McFadin, Et Al.; Texas Parks & Wildlife Department and Texas Water Commission; City of Converse, Texas and the City of Kirby, Texas; Lafarge Corporation; Bulverde Utility Co., Etc., Et Al.; Green Valley Water Supply Corp., Et Al.; St. Mary's University of San Antonio, Et Al.; and Lackland City Water Company, Defendants-Appellees.

Appeal from the United States District Court for the
Western District of Texas

Before CLARK, Chief Judge, WILLIAMS and DAVIS, Circuit Judges.

JUDGMENT

This cause came on to be heard on the record on appeal and was argued by counsel.

ON CONSIDERATION WHEREOF, It is now here ordered and adjudged by this Court that the judgment of the District Court in this cause is vacated, and the cause is remanded to the District Court for further proceedings in accordance with the opinion of this Court.

IT IS FURTHER ORDERED that each party bear its own costs on appeal.

A true copy
Test August 2, 1991
Clerk, U. S. Court of Appeals, Fifth Circuit
By ____
Deputy AUG 26 1991
New Orleans, Louisiana

ISSUED AS MANDATE: AUG 26 1991

GUADALUPE–BLANCO RIVER AUTHORITY, Etc., Plaintiff,

v.

CITY OF LYTLE, Et Al., Defendants.

UNITED STATES DEPARTMENTS OF the ARMY AND AIR FORCE, Defendants–Appellants,

and

The San Antonio Parties, Intervenor–Appellant,

v.

GUADALUPE–BLANCO RIVER AUTHORITY, Etc., Plaintiff–Appellee,

and

City of San Marcos; City of New Braunfels and New Braunfels Utilities; Danny McFadin, Et Al.; Texas Parks & Wildlife Department and Texas Water Commission; City of Converse, Texas and the City of Kirby, Texas; Lafarge Corporation; Bulverde Utility Co., Etc., Et Al.; Green Valley Water Supply Corp., Et Al.; St. Mary's University of San Antonio, Et Al.; and Lackland City Water Company, Defendants–Appellees.

No. 90–8064.

United States Court of Appeals, Fifth Circuit.

Aug. 2, 1991.

River authority brought suit in state court for adjudication of water rights to aquifer. Named as defendants were the Departments of the Army and Air Force. After removal of the case by the government, the United States District Court for the Western District of Texas, James R. Nowlin, J., held that government had waived its sovereign immunity in the McCarran Amendment, but remanded case to state court in an exercise of *Burford* abstention. Government appealed. The Court of Appeals, Jerre S. Williams, Circuit Judge, held that district court lacked subject matter jurisdiction under federal officer statute, since federal agencies are not entitled to assert federal officer jurisdiction.

Vacated with instructions.

Removal of Cases 🔑21

District court lacked removal jurisdiction over action seeking adjudication of water rights in which the Departments of the Army and Air Force were named as defendants; agencies are not entitled to rely on statute granting jurisdiction over cases in which a federal officer is a defendant, parties were not diverse, and case did not involve federal question. 28 U.S.C.A. § 1442(a)(1).

Dick D. Snel (argued), Robert L. Klarquist, Attys., Appellate Section, Environmental and Natural Resources Div., U.S. Dept. of Justice, Washington, D.C., for U.S.

Elbert Hooper, Hooper & Haag, Austin, Tex., for City of New Braunfels, et al.

P.M. Schenkkan (argued), Roger P. Nevola, Ms. Kim Brightwell, Richard Milvenan, Mr. Thomas Pelto, Mr. Donald Neal, Vinson & Elkins, Austin, Tex., Harry M. Reasoner, Charles L. Berry, Vinson & Elkins, Houston, Tex., for Guadalupe–Blanco.

Edmund McCarthy, Austin, Tex., for City of San Marcos.

Sydney W. Falk, Jr. (argued), Douglas G. Caroom, Bickerstaff, Heath & Smiley, Austin, Tex., for McFadin, et al. and amicus-Texas Farm Bureau.

Ken Cross, Asst. Atty. Gen., State of Tex., Austin, Tex., for Texas Water Com'n & Texas Park.

Fred Shannon, Cynthia F. Malone, Shannon & Weidenbach, Inc., San Antonio, Tex., for Lackland City Water Co.

Phil Steven Kosub, Saulen & Wallace, San Antonio, Tex., for City of Converse & City of Kirby.

James E. Cousar, Thompson & Knight, Austin, Tex., for Lafarge Corp.

Mark H. Zeppa, Austin, Tex., for Bulverde Utility, et al.

Louis T. Rosenberg, San Antonio, Tex., for Green Valley Water Supply.

Kevin M. Beiter, Terry S. Bickerton, Cox & Smith, Inc., San Antonio, Tex., for St. Mary's Univ., et al.

Jim Mathews (argued), Lloyd, Gosselink, Fowler, Blevins & Mathews, Austin, Tex., for intervenors San Antonio Parties.

Appeal from the United States District Court for the Western District of Texas.

Before CLARK, Chief Judge, WILLIAMS and DAVIS, Circuit Judges.

JERRE S. WILLIAMS, Circuit Judge:

Guadalupe–Blanco River Authority ("GBRA")[1] brought this suit in Texas state court for an adjudication of the water rights to the Edwards Aquifer.[2] GBRA's case is based entirely on Texas law. Named as defendants are over 200 current users of the Edwards Aquifer's waters, including the United States Departments of Army and Air Force ("the government"), both of which pump water from Edwards Aquifer for military bases in San Antonio.

The government removed the case to federal district court pursuant to 28 U.S.C. § 1442(a)(1) and moved to dismiss the case against it on the ground of sovereign immunity. The district court held that removal was proper and that the government had waived its sovereign immunity in the McCarran Amendment, 43 U.S.C. § 666. To avoid needless conflict with a state's administration of its own affairs, the court then remanded the case to state court in an exercise of *Burford* abstention. *Burford v. Sun Oil Co.*, 319 U.S. 315, 63 S.Ct. 1098, 87 L.Ed. 1424 (1943). The government appeals the district court's refusal to dismiss it as a party under the doctrine of sovereign immunity.

The appellees argue that the district court should have remanded this case pursuant to 28 U.S.C. § 1447(c) because the case was improperly removed. Specifically, the appellees contend that removal was improper because the federal courts lack subject matter jurisdiction over this case. We agree. Federal courts are courts of limited jurisdiction. We therefore have a constitutional obligation to satisfy ourselves that we have been given the authority to consider the subject matter before us—in other words, whether we have subject matter jurisdiction. The government removed this case under 28 U.S.C. § 1442(a)(1), federal officer removal. This provision "is a pure jurisdictional statute, seeking to do nothing more than grant district court jurisdiction over cases in which a federal officer is a defendant." *Mesa v. California*, 489 U.S. 121, 136, 109 S.Ct. 959, 968, 103 L.Ed.2d 99 (1989). In the past, this Circuit has permitted agencies to remove under § 1442(a)(1). *See, e.g., IMFC Professional Servs. v. Latin Am. Home Health, Inc.*, 676 F.2d 152, 160 (5th Cir. Unit B 1982).

The Supreme Court recently held, however, that federal agencies are not entitled to assert federal officer removal; only a federal officer is. *International Primate Protection League v. Administrators of the Tulane Educ. Fund*, — U.S. —, —, 111 S.Ct. 1700, 1703, 114 L.Ed.2d 134 (1991). Therefore, the United States Departments of the Army and Air Force, agencies of the United States, are not entitled to rely on § 1442(a)(1) as a basis for jurisdiction. Section 1442(a)(1) is the only possible basis for federal subject matter jurisdiction in this case. The parties are not diverse, nor is this a case involving federal question jurisdiction. We must conclude therefore that the federal court is without subject matter jurisdiction. "If at any time before final judgment it appears that the district court lacks subject matter jurisdiction, the case shall be remanded." 28 U.S.C. § 1447(c); *see also International Primate,* — U.S. at —, 111 S.Ct. at 1709.

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[1] GBRA is a conservation and reclamation district, organized under Tex. Const. Art. 16, § 59. It is empowered to acquire surface water rights, construct dams and reservoirs, and sell water.

[2] According to GBRA, "[t]he Edwards [Aquifer] is an underground conduit [which] captures and diverts the flows of major surface streams in the Nueces and San Antonio River Basins [and] conveys those waters underground and discharges them into the Guadalupe River Basin at the conduit's surface outlets, the two largest springs in Texas: the Comal Springs at New Braunfels, and the San Marcos Springs at San Marcos."

We vacate the district court's judgment, including the ruling finding a waiver of sovereign immunity, and order the case remanded to the state court under 28 U.S.C. § 1447(c). Because we lack subject matter jurisdiction, we do not decide the merits of the government's appeal.

VACATED WITH INSTRUCTIONS.

forms and procedures to be used by local recording agents in charging fees. These procedures include a requirement that the fees which can be charged are those listed in Article 21.14, §4(e), and similar transmission or reproduction costs. Further, there is a requirement mandating the use of the Disclosure Statement for Local Recording Agents' Fees. Such disclosure statement is incorporated by reference in this adoption. The board has filed copies of this form with the Office of the Secretary of State, Texas Register Section. Persons desiring copies of the form can obtain such copies from the Agents License Section of the Texas Department of Insurance, Mail Code 107-1A, 333 Guadalupe Street, P.O. Box 149104, Austin, Texas 78714-9104. The disclosure statement requires the disclosure of the local recording agent's commission on the transaction, an explanation of the reason the fees were not anticipated in such commission; the written agreement of the client to the charges, the telephone number of the Claims and Complaints Section of the Texas Department of Insurance, with a statement that the client may call that number if the client did not agree in advance to the charges, or if the client does not agree to the fairness of the charges; and a complete list of the services being billed and the costs of such services. The procedures require that the disclosure statement and files relating to the fees must be maintained by the local recording agent and made available to the Texas Department of Insurance upon request.

A total of 40 insurance agencies submitted written comments on the sections, and each had recommendations for change to the sections as proposed. No comments were received in favor of the sections as published. Those commenting on the sections as published include the following: Lanny Aiken Insurance Agency, Inc., Axe Insurance Agency, Inc., Best Insurance Services, Inc; Borden Insurance; Bunker Hill Insurance Agency, Inc.; Campbell Insurance Agency; Carter and Company; Clayburne Agency, Inc., Bill DeArmond Insurance Agency; Eagle Pass Insurance Agency, Inc., El Dorado Insurance; Ewing Insurance Services; Jim Felker Insurance Agency; Gibbins Insurance Agency; Grether/King and Associates, Inc.; Hilb, Rogal, and Hamilton Company of Dallas; Jolly Heath Insurance Agency, Inc.; Hutcheson Insurance Agency; Leick, Tucker, and Knight Insurance; Billy Martin Insurance; McLemore Insurance Agency; McRany-Scott Insurance Agency; John Nanninga-Insurance; Nelson Insurance Agency; Nitsche, Blackmon, and Sweeney Preston Agency, Inc.; Rainwater Insurance Agency, Inc.; Reese-Pleasant Insurance Agency, Inc.; Rogers and Belding Insurance Agency, Inc.; Rollins Burdick Hunter Agency of Texas, Inc.; The Sammons Agency; Sterling Insurance Agency; Don C. Tardy Company, Templeton Southwest Insurance Agency, Inc.; Texas Insurance Agency, Inc.; Texas State Low Cost Insurance, Inc.; Thompson, Coe, Cousins, and Irons; Wallace and Skiles, Inc.; Wilco Insurance Agency; John D. Williams Agency.

A number of commenters complained that companies generally are reducing commission rates on coverages, while at the same time expecting agents to assume increasingly higher administrative burdens in placing and servicing business. Other commenters proposed they be permitted to charge "application", "placement", "handling", "processing", or substantially similar fees for the placing of particular types of coverages in instances where payment of a commission is either absent or set at a very low amount. The agency responds that approval of such a fee would go beyond the specific list of the fees provided for in the Insurance Code, Article 21.14, §4(e), therefore, the final adoptions makes no change to incorporate the recommendation. A commenter objected to the disclosure requirement as unreasonable and beyond the authority of the Texas Department of Insurance. The Board considers the requirement a reasonable exercise of its rulemaking authority to carry out the intent of the statute. Other commenters requested authority to charge for other services capable of being defined as "customary" duties of agents. Some commenters suggested the need for authority to charge for "servicing", "incidental", and "other repetitive" expenses. The agency responds that both those categories of fees are outside those which are set forth in Article 21.14, §4(e), and relate to an area or areas which have been only very generally identified and not precisely defined; therefore, the final adoption makes no change to incorporate the recommendation.

The new sections are adopted under the Insurance Code, Articles 21.14 and 1.04, and Texas Civil Statutes, Article 6252-13a, §4 and §5. Section 2 of Acts 1991, 72nd Legislature, Chapter 628, which enacted the Insurance Code, Article 21.14, §4 and §5 authorize and require each state agency to adopt rules of practice setting forth the nature and requirement of available procedures, and prescribe the procedures for adoption of rules by a state administrative agency. The adopted sections affect the Insurance Code, Article 21.14 by regulation of fees charged by local recording agents.

This agency hereby certifies that the rule as adopted has been reviewed by legal counsel and found to be a valid exercise of the agency's legal authority.

Issued in Austin, Texas, on September 21, 1992.

TRD-9212826

Linda K. von Quintus-Dorn
Chief Clerk
Texas Department of
Insurance

Effective date: October 12, 1992

Proposal publication date: March 6, 1992

For further information, please call: (512) 463-6327

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TITLE 31. NATURAL RESOURCES AND CONSERVATION

Part IX. Texas Water Commission

Chapter 298. Edwards Underground River

Subchapter A. General Provisions

• 31 TAC §§298.1-298.7

The Texas Water Commission (TWC) adopts new Chapter 298, §§298.1-298.7, 298.11-298.20, 298.21-298.23, 298.31, 298.32, 298.41, 298.42, 298.51, and 298.61, with changes to the proposed text as published in the April 24, 1992, issue of the *Texas Register* (17 TexReg 2950). The new sections concern the commission determination and administration of rights to the use of state water in the Southern, or Balcones Fault Zone, portion of the Edwards Aquifer (Edwards Underground River) and the protection of the water quality of the Edwards Underground River and related surface streams pursuant to the Texas Water Code, Chapters 11 and 26, and other applicable law. In the preamble and the rules, the terms "aquifer," "Edwards Aquifer," "underground river," and "Edwards Underground River" are used interchangeably.

The purpose of this chapter is to: protect the water quality of the Edwards Underground River; protect the water quality of the surface streams to which the Edwards Underground River provides significant springflow; achieve water conservation; maximize the beneficial use of water available for diversion from the underground river; protect springflow necessary for the maintenance of aquatic and wildlife habitat, protect the public health, safety, and welfare; and provide for instream uses and bays and estuaries. To accomplish these purposes, the chapter provides procedures for the appropriation of state water in the Edwards Underground River and the implementation of a water management plan.

Subchapter A: General Provisions, §§298.1-298.7, contains rules relating to: the finding of the Southern, or Balcones Fault Zone, portion of the Edwards Aquifer as an underground river and, thus, state water; defining the boundaries of the underground river; the applicability of existing commission rules to the underground river; and the definitions of terms used in the chapter. Generally, those existing rules of the commission which apply to the diversion and use of state water from surface streams are applicable to the diversion and use of state water from the Edwards Underground River, except where necessary to reflect the unique characteristics of the sub-surface source of water.

Subchapter B: Permits and Other Authorizations, §§298.11-298.20, contains rules providing that, except for certain exempt domestic and livestock uses, all users of the Edwards Underground River must obtain commission authorization for the diversion and use of water. Those currently diverting water from the Edwards Underground River and who can demonstrate a historical record of actual beneficial use prior to April 15, 1992, the effective date of related emergency rules, are provided interim authorization by rule to continue beneficially using such water without waste until a final determination is made on their permit applications. Interim authorization will be granted only to those current users who submit a declaration of historical use on or before November 1, 1992 and a water conservation plan and all necessary application fees on or before June 1, 1993. A declaration of historical use shall constitute an application for a permit. The commission shall not take action on any application prior to June 1, 1993.

A moratorium will be imposed on the commission review and action on applications by persons not qualifying for interim authorization until final action is taken on those declarations of historical use submitted on or before November 1, 1992, and for which a water conservation plan and application fees have been timely submitted. The moratorium is necessary until historical claims can be evaluated and a determination is made on the availability of unappropriated water for new uses. Such applications for new use, if approved, shall be subordinate in priority to permits issued for applications submitted by persons qualifying for interim authorization.

During the moratorium, a person may not drill and withdraw water from a new well unless the new well is for an exempt domestic and livestock use or is to be used to replace or backup an existing well. A new well is a well which was not completed and withdrawing water for a beneficial purpose prior to April 15, 1992, the effective date of the moratorium as provided by related emergency rules. Before water may be withdrawn from the replacement well, production from the old well which it replaces must cease and subsequently the well must be plugged or closed.

The rules further provide objective criteria to be used in determining a right of diversion based upon: the applicant's need and purpose of use, the applicant's record of historical use and potential for reduction from the historical amount by the elimination of waste and the implementation of reasonable water conservation and reuse measures; and the total amount of available water to be diverted from the Edwards Underground River as established by Subchapters E and F.

Subchapter C. Conveyances, §§298.21-298.23, contains rules providing for the approval and notification of contractual sales of water and the transfer and sale of water rights to the Edwards Underground River. The subchapter also contains a rule relating to the application by a city or town to acquire an appropriation from another water right holder without compensation pursuant to the Wagstaff Act, Texas Water Code, §11.028; however, the rules establish strict criteria that must be met.

Subchapter D: Water Use Measurement and Reporting, §298.31 and §298.32, contains rules requiring that all wells must be equipped with a measuring device or, subject to approval by the executive director, some other equally accurate means of measuring the amount of water diverted must be provided. The subchapter also contains a rule requiring annual use reports to be submitted to the commission.

Subchapter E. Regulation of Diversions-General, §298.41 and §298.42, contains rules prohibiting the waste of water and providing that total authorizations to directly divert and use water from the Edwards Underground River shall be limited in order to achieve water conservation, maximize the beneficial use of the water available for diversion from the underground river; protect water quality and the public health, safety, and welfare, protect aquatic and wildlife habitat, and provide for instream uses and bays and estuaries. In order to achieve these goals without severely disrupting the affected region's economy and ability to provide for the region's water supply needs, the total amount which may initially be diverted directly from the Edwards Underground River shall not exceed 450,000 acre-feet per calendar year. This total amount shall be reduced so as not to exceed 400,000 acre-feet per calendar year not later than December 31, 2007, by the implementation of water conservation and reuse measures, the purchase and retirement of water rights, and/or the development of alternative sources of water supply. If the level of the Edwards Underground River is higher than 665 feet above mean sea level as measured at the J-17 index well (State Well Number AY-68-37-203), however, the commission may grant additional amounts above these total limitations on an interruptible basis not to initially exceed 86,000 acre-feet per year. If, through studies, it is determined that additional water supplies are available from the Edwards Underground River, either directly or indirectly, the commission may consider modification of the limitations established by these rules. The commission will ensure that studies be completed which will determine the impact of water management strategies such as springflow augmentation, diversions downstream of the springs, supplemental recharge, conjunctive management of surface and subsurface water, and other strategies to optimize the use of the Edwards Underground River and still provide sufficient protection for water quality, aquatic and wildlife habitat, and other appropriate purposes.

Subchapter F. Regulation of Diversions-Emergency, §298.51, contains rules providing that, in order to provide additional protection for springflow from the Comal and San Marcos Springs and to protect aquatic and wildlife habitat when water levels fall critically low, the total, authorized amount of water which may diverted directly from the Edwards Underground River may not exceed 350,000 acre-feet per calendar year once the level of the Edwards Aquifer drops to 625 feet above mean sea level as measured at the J-17 index well. Water levels recorded in this well have closely correlated to the amount of springflows at Comal Springs. This reduction shall be achieved generally by: the curtailment of non-essential uses such as lawn watering, landscaping, ornamental fountains and pools, and other recreational and aesthetic uses not necessary for the protection of the public health, safety, and welfare by the implementation of permittees' drought management plans contained in the water conservation plans as approved by the commission, the lease or purchase by permittees of others' water rights to divert water from the Edwards Underground River, and/or the use of alternative sources of water. The rules also provide that, upon implementation of this subchapter, the executive director shall consult with the United States Fish and Wildlife Service and the Texas Parks and Wildlife Department on appropriate actions the commission should take.

Subchapter G. Local Government, §298.61 provides for the involvement of affected local governmental entities in the presentation of comments and recommendations to the commission regarding the regulation of the Edwards Underground River. The proposed subchapter also provides for the possible creation of a seperate water division for the Edwards Underground River and the appointment of a local regulatory entity with sufficient jurisdiction and authority to act as the watermaster for the Edwards Underground River, unless prohibited by law.

Need for Commission Action. The dispute over the management of the Southern Edwards Aquifer (Edwards Aquifer or Edwards Underground River) affects the rights to and water quality of almost all subsurface and surface water in the Nueces, San Antonio, and Guadalupe River Basins. It also affects aquatic and riparian habitat in both surface and subsurface waters, including habitat located in the aquifer and at or near the Comal and San Marcos Springs. Despite the great economic and environmental significance of the Edwards Aquifer to the South Central Region of Texas and to the state itself, there exists no comprehensive management plan for this unique and vital resource.

This inaction in the face of growing and unchecked demand on the Edwards Aquifer has led to a situation which threatens the public health, safety, and welfare and the economic well-being of the region. The uncertainty over a person's right to use water from the Edwards Aquifer because of current litigation discourages business investment and economic growth. This uncertainty also makes it difficult, if not impossible, to develop a management plan to provide for the immediate and long-term water supply needs of the region. Finally, a person's right to use water from a common source shared by others has little value and cannot be protected unless effective and necessary controls are applied to everyone's use.

Almost four decades of negotiations among the affected parties have failed to yield a resolution of the dispute regarding the proper management of the Edwards Aquifer. Legislation seeking to provide a comprehensive and lasting resolution to this issue has been repeatedly defeated. Efforts by San Antonio Mayor Henry Cisneros and local representatives of the Edwards Underground Water District during 1986 and 1987 to develop a regional water management plan ended in defeat in the Texas Legislature and resulted in the breakup of the district. Beginning in November 1989 and continuing until his untimely death in August 1991, Texas Water

Commissioner John Birdwell made exhaustive and earnest efforts to bring about a local resolution of the dispute. A professional mediator and the mayor of Austin have also unsuccessfully attempted to mediate a settlement. Protracted and costly litigation in both state and federal courts has dragged on for years and trials on the merits have not yet occurred. The creation of a special joint legislative committee in 1990 failed to produce a consensus report, much less proposed legislation. Most recently, strenuous efforts by the current chairman of the Texas Water Commission, John Hall, during the spring of 1992 also failed to produce a settlement.

The Edwards Aquifer is the sole source of water supply for approximately 1.5 million citizens in the San Antonio region and supports a diverse regional economy that provides employment for approximately 700,000 to 800,000 Texans. Additionally, the Edwards Aquifer is important to the economies of the communities at and downstream of several springs fed by this underground river. These springs include the state's two largest natural springs at New Braunfels and San Marcos. These two springs sustain a significant tourist and recreational economy for these cities.

It is estimated that spring flow from Comal and San Marcos Springs alone provides 21 to 32% of the total annual flow of the Guadalupe River at Victoria. Between 70,000 and 80,000 jobs exist in those counties that are supplied with water from the Guadalupe River below these springs. The economies of Hays and Comal Counties and the counties downstream of the springs are clearly dependent on the Edwards Aquifer. Located at the mouth of the Guadalupe River are the Guadalupe and San Antonio Bays and the Aransas National Wildlife Refuge. Freshwater inflows provided by the river to the bays and estuaries are critical to the maintenance of estuarine habitat. This underground river is truly the lifeline of 15 Texas counties.

A lawsuit has been filed under the federal Endangered Species Act, 16 United States Code, §§1531-1544, which seeks to provide protection for endangered and threatened species at and downstream of Comal and San Marcos Springs and in the aquifer. This lawsuit threatens to invoke federal regulation of a state water resource. The water management plan contained in these rules is intended, among other things, to provide the basis for a resolution by the state of the issues raised in this lawsuit. This plan allows for the necessary planning and preparation, including time to develop alternative sources of water supply.

Problems Resulting from a Lack of a Water Management Plan. During the recorded period of 1934-1988, long-term average annual recharge of 625,000 acre-feet was equal to long-term average withdrawal from wells and springflow. On an annual basis, recharge has sometimes exceeded and sometimes fallen below such withdrawals and discharges. The maximum estimated annual withdrawal during this period was 540,000 acre-feet. During the worst drought of record, which occurred in the 1950's, recharge amounts fell well below estimated annual withdrawals of 250,000 acre-feet for several consecutive years, lowering the aquifer's level and, consequently, causing Comal Springs to cease flowing for five months in 1956.

It is anticipated that demands on the Edwards Underground River will increase steadily, while recharge, which is dependent upon rainfall, is highly variable. Problems resulting from the overdrafting, or "mining," of the aquifer should include: short-term droughts (two-three years) could cause aquifer levels to fall rapidly, possibly to the point where the Comal and/or San Marcos Springs would cease to flow, economic risks from increased pumping costs and uncertain supplies of water would increase in agricultural, industrial, and other economic sectors, long-term drought comparable to the 1950's could cause both Comal and San Marcos Springs to go dry, severely damaging the habitat of endangered species and decreasing the amount of water available to downstream users, resulting in adverse impacts to agriculture and industry; the drop in aquifer level could cause encroachment of "bad" water into some portions of the aquifer, including water laden with high mineral content and salinity levels; and the uncertainty over a person's right to use water from the Edwards Aquifer makes it difficult to provide for the immediate and long-term water supply needs of the region and could discourage business investment and economic growth.

Reduction in springflows caused by diversions from the Edwards Aquifer could adversely affect the water quality, aquatic and wildlife habitat, and other instream uses of surface streams downstream of the springs as well as bays and estuaries. A decrease in the quantity of the water in a stream lessens its assimilative capacity for effluent discharges and other sources of pollution. If springflows fall below certain minimum levels, then the stream segments below the springs would be dominated by return flows from municipal and industrial discharges, along with an undetermined amount of contaminated runoff from adjacent urban and agricultural areas. The result would be pollutant overloading of these streams. The nonpoint source pollution, elevated nutrient concentrations, and increased ambient temperature could devastate the ecological character of the streams immediately below the springs as well as further downstream in the Guadalupe River Basin.

Finally, the direct hydrologic connection between the Edwards Aquifer and surface streams in the contributory watershed requires the careful management of diversions from and wastewater discharges to rivers which flow into and provide "recharge" to the aquifer. Such management is necessary to protect the water quality of the aquifer. In reviewing applications for diversions from or discharges to these surface streams and pollution abatement plans for development in the recharge zone, the commission shall consider their impact upon the goals and purposes of this chapter.

Public Comment-Public Comment Hearings. The TWC provided a 68-day period for notice and public comment regarding the proposed rules, beginning the day of publication of the proposed rules, April 24, 1992, and continuing through June 30, 1992. A representative of TWC conducted five public comment hearings during this period throughout the South Central Texas region. These hearings were held in: Austin on May 22, 1992, San Antonio on May 26, 1992, Uvalde on May 27, 1992, Austin on May 29, 1992, and in San Antonio on June 30, 1992.

Notice of all hearings was published in the *Texas Register* (17 TexReg 3661 and 4139). Additionally, press releases were sent to all major newspapers in the affected region. These newspapers included: San Antonio Express News, San Antonio Light, New Braunfels Herald-Zeitung, San Marcos Record, San Marcos News, Wimberley View, Castroville News Bulletin, Medina Valley Times, Divine News; Hondo Anvil Herald, Uvalde Leader-News; Associated Press; United Press International; all television news operations in San Antonio and Austin, and numerous radio news operations in the San Antonio/Austin region. Mailed notice was also provided to applicable local districts and state and federal agencies.

All hearings were conducted by a hearings examiner of the commission in accordance with applicable provisions contained in the Administrative Procedure and Texas Register Act, Texas Civil Statutes, Article 6252-13a, and commission rules contained in 31 TAC §§275.71 et seq, and all other applicable law. The hearings were held with afternoon and evening sessions to provide the greatest opportunity for citizens to appear at the hearings and listen to and give public comment. Because it was anticipated that public comment regarding the proposed rule that the Edwards Aquifer is an underground river and, thus, state water subject to commission regulation, would be lengthy and technical in nature, the May 22, 1992, public comment hearing was held specifically on this proposed rule. However, comment on this proposed rule was not precluded from the other public comment hearings.

During the public comment period, over 135 written comments were received, over 400 exhibits were submitted into the record, and approximately 30 hours of oral testimony were heard.

At the commission's regular meeting on August 26, 1992, commission staff presented a summary of the comments and recommended changes to the proposed rules in response to the comments. Copies of staff's recommended changes were made available to the public. The commission allowed additional written public comment to be submitted through September 4, 1992.

General Commentary. There were three main categories of comments: those in general support of commission regulation of the Edwards Aquifer; those that were in favor of local management; and those in general opposition to the rules and to any regulation of the use of the Edwards Aquifer.

Those in general support of the proposed rules and TWC regulation of the Edwards Aquifer stated that such support was based upon the belief that the Edwards Aquifer is an important resource to the region and to the state, that a management plan is much needed for this resource, that local resolution of the management dispute is unlikely, that the legislature has failed to act and is unlikely to act, that federal intervention pursuant to the Endangered Species Act is not an appropriate way to manage the Edwards Aquifer, and that TWC has the authority and the expertise to properly manage the Edwards Aquifer in conjunction with related surface streams. These comments also included the request for more clarification as to the policies and goals to be accomplished through the management of the Edwards Aquifer and for more specific criteria to be contained in the rules relating to the determination of individual water rights in accomplishing these goals and policies.

Elected officials and governmental entities that provided comment in general support of the rules and TWC regulation of the Edwards Aquifer include: a Texas railroad commissioner; two Texas state representatives; the Guadalupe-Blanco River Authority; the Comal County Commissioners Court; the City of San Marcos; the City of New Braunfels and New Braunfels Utilities; the Canyon Regional Water Authority; the City of Sequin; the Texas Parks and Wildlife Department; and the United States Fish and Wildlife Service.

Groups and associations that provided comment in general support of the proposed rules include: the Industrial Water Users of the Lower Guadalupe River (BP Chemicals, Du Pont, Union Carbide, Carbon/Graphite Group, Oxychem, and Central Power and Light Company); the Sierra Club (Alamo Group); the Sierra Club (Lone Star Chapter); the Guadalupe Valley Electric Co-op, Inc.; the Environmental Defense Fund; the Barton Springs Polar Club; the Seguin and Guadalupe County Chamber of Commerce; the Atascosa Rural Water Supply Corporation; the Canyon Lake Area Citizens Association; and the Travis Audubon Society.

Those in support of local management of the Edwards Aquifer recognized the need for management of this important resource but either maintained that the Edwards Aquifer is not state water or took no position on the issue. Commenters in this group recommended either that the Edwards Aquifer should be regulated by one or more underground water conservation districts pursuant to the Texas Water Code, Chapter 52, or by a regional entity created by special legislation.

Elected officials and governmental entities in support of local management, or for some form of management without stating a position on TWC jurisdiction, of the Edwards Aquifer include: two Texas state representatives; the Edwards Underground Water District; the Medina County Underground Water District; the Dimmit County Underground Water Conservation District; the Plateau Underground Water Conservation and Supply District; the Hickory Underground Water Conservation District Number 1; the Brush Country Underground Water Conservation District; Schleicher County Commissioners Court; the Irion County Water Conservation District; the Santa Rita Underground Water Conservation District; the Fort Bend Subsidence District; the Harris-Galveston Coastal Subsidence District; the City of Alamo Heights; the Nueces River Authority; the City of San Antonio Water System; and the Texas Department of Agriculture.

Groups and associations in support of local management include: the Medina County Water Protection and Conservation Association; the St. Lawrence Cotton Growers Association (Glasscock, Reagan, Upton, and Midland Counties), the Nueces River Authority; the Greater San Antonio Builders Association; the San Antonio Manufacturers Association; the Corn Processors, Inc., (Uvalde County); Texas AgriWomen (Mission); and the Texas Department of Agriculture.

Those in general opposition to the regulation of the Edwards Aquifer maintained that the Edwards Aquifer is privately-owned groundwater subject to an absolute rule of capture by the overlying landowner.

Elected officials and governmental entities that provided comment in general opposition to regulation of the Edwards Aquifer include: a Texas state representative-elect; the Uvalde County Commissioners Court; the Kinney County Commissioners Court; and the City of Uvalde;

Groups and associations that provided comment in general opposition to regulation of the Edwards Aquifer include: the Texas Farm Bureau; the Bexar County Farm Bureau; the Texas Nurserymen Association; the Texas and Southwestern Cattle Raisers Association; the Texas Sheep and Goat Raisers Association; the Uvalde County Water Conservation Association; the Aquifer Protection Committee; the Friends from Uvalde; the Uvalde Area Development Foundation; the Southwest Texas Property Rights Association; Inland Ocean, Inc. ; and the Texas Association of Concerned Taxpayers.

Underground River Determination. Those in general opposition to TWC regulation of the Edwards Aquifer and the proposed rules expressed disagreement with the rule contained in §298.2 providing that the Southern, or Balcones Fault Zone portion of the Edwards Aquifer is an underground river and, thus, state water subject to commission regulation. Rather, it is their opinion that the Edwards Aquifer is percolating groundwater and, thus, private water owned by the landowner. Furthermore, it is their opinion that any state regulation of their use of water from the Edwards Aquifer would be an unconstitutional taking of private property without just compensation.

Many of the commenters based their opposition to the finding of the Edwards Aquifer as an underground river upon previous orders of the commission relating to the delineation of the boundaries of the Edwards Aquifer, the enabling acts of the Edwards Underground Water District and the Medina County Underground Water Conservation District, the Texas Water Code, §11.023(c) and (d), and discussion of the use of groundwater in the adjudications of the right to use surface water in the Medina, Nueces, Guadalupe, and San Antonio rivers. Also, some commenters stated that the commission lacked authority to determine whether the Edwards Aquifer constitutes state water.

Additionally, three individuals commented that the Edwards Aquifer did not meet the hydrogeologic characteristics necessary to constitute an underground river. Specifically, one commenter stated that, in drilling wells in Uvalde and Medina Counties, he has seen no evidence of aquatic life, i.e. blind catfish, in the Edwards Aquifer. He also stated that the Edwards Aquifer in Medina County did not have a good, strong, consistent directional flow because of tight faulting in the north portion of the county, the absence of significant flow in the middle portion, and the existence of low or no flow in the south evidenced by the existence of highly mineralized water. He further stated that the Edwards Aquifer actually backflows westward to the Leona Gravel because of the resistance and low transmissivity rate in Medina County.

Another commenter stated that, based upon his expert knowledge of the Edwards Aquifer, the boundaries were not well known. One reason for this, he stated, was that the Glen Rose formation was also a part of the Edwards Aquifer and that the Del Rio Clay and Austin Chalk were at the same elevations as the Edwards Aquifer. He further stated that the directional flow of the Edwards was not well understood and that the Edwards has a "low storage co-efficient."

Finally, a commenter stated that, based upon wells that had been drilled on his property, he doubted whether the Edwards Aquifer had flow or was of consistent or sufficient utility because of the depth necessary for a well to be drilled before it produced a significant amount of water for irrigation. He described the water as "oozing" rather than flowing.

In support of the finding of the Edwards Aquifer as an underground river, the Guadalupe-Blanco River Authority submitted 384 exhibits and the comments and affidavits of six expert witnesses, including hydrologists, geologists, a biologist, and a law professor. The exhibits include models, photographs, and over 250 published studies, reports, and treatises concerning the Edwards Aquifer and related water formations.

After a careful and thorough review and analysis of all public comments, applicable law, available studies, reports, data, and other information, the commission respectfully disagrees with comments in opposition to the finding of the Edwards Aquifer as an underground river and, thus, state water subject to commission regulation pursuant to the Texas Water Code, Chapter 11.

Location and Physical Characteristics. The Edwards Aquifer has been extensively studied for many years and is generally well understood. Recent studies, reports, and models have provided a large amount of information regarding the physical characteristics and hydrogeology of the Edwards Aquifer. Much of this information was submitted into the record during the public comment period and forms a basis of the commission's determination that the Edwards Aquifer is an underground stream.

First, the traditional designation of this water resource as an "aquifer" simply means that it is a subsurface, water-bearing formation. There are many types of aquifers, from static, water-bearing sands such as the Ogallala Aquifer, to the free-flowing karst formation of the Edwards Aquifer. This geological designation does not preclude an aquifer from being legally designated an underground stream. For example, a federal court in California recently determined that an aquifer constitutes an "underground river" as provided under California state law *United States v Fallbrook Public Utility District*, 347 F.2d 48 (9th Cir 1965).

The Southern, or Balcones Fault Zone portion of the Edwards Aquifer is located in the South Central Region of Texas and underlies portions of Kinney, Atascosa, Uvalde, Medina, Bexar, Guadalupe, Comal, and Hays Counties. The westernmost boundary of the aquifer is at the hydrologic divide near Brackettville in Kinney County. This divide separates the aquifer from subsurface water flows to the Rio Grande Basin The Balcones Fault Zone portion of the aquifer extends through these eight counties in the shape of a crescent to its northern boundary at the hydrologic divide near Kyle in Hays County. This divide separates the Balcones Fault Zone portion of the aquifer from the Northern or Austin region of the Edwards Aquifer The Edwards Aquifer is underlain by the Upper Member of the Glen Rose Formation and confined by the overlying Del Rio Clay.

The Southern Edwards Aquifer is approximately 175 miles long and covers an expanse of about 3,600 square miles. The average width of the aquifer is 25 miles. The average depth is 500 feet below the surface and ranges from zero feet at its outcrop on the land surface to 2,500 feet below the surface.

The Edwards Aquifer is a karst aquifer, comprised of limestone and dolomite. It is highly porous, containing interconnecting channels and caves. These openings range in size from microscopic to large caverns. They include hairline cracks, open fractures, honeycombed zones, and a wide variety of cavities so that the aquifer resembles a huge stone sponge. Water flows relatively quickly through these openings.

Along the aquifer's southern and eastern borders is what is known as the "bad water line." This is where there is potential for underground saltwater intrusion into the aquifer if aquifer hydrologic pressure is lessened. Water movement through the aquifer is slowest here and remains in contact with limestone and gypsum longer, allowing dissolved mineral solids to increase to over 1,000 milligrams per liter. When this occurs, the water falls well below public drinking water standards. The freshwater area of the aquifer typically has only 350 parts per million and, generally, is so pure as to not require treatment for human consumption.

The aquifer generally falls in elevation from west to east, dipping toward the Gulf of Mexico. The west end of the top of the formation is at approximately 1,200 feet above mean sea level (msl), and the San Marcos Springs in Hays County are about at 575 feet msl, a drop of 625 feet in about 166 miles. This is a slope of about 3.8 feet per mile, or about 0.07%

The Edwards Aquifer cuts beneath and through the middle of several surface river basins. These basins originate above the recharge zone of the aquifer and include, from west to east, the Nueces, the San Antonio, and the Guadalupe River Basins. Over 75% of the water in the Edwards Aquifer comes from the surface flows in the upper segments of these basins. These streams are located in the upper portion of the Nueces River Basin, the upper portion of the San Antonio River Basin, and a part of the upper portion of the Guadalupe River Basin (the "contributory watershed"). The major tributary streams include the West Nueces, Nueces, Dry Frio, Frio, Sabinal, Seco, Hondo, Medina, Helotes, Salado, Cibolo, Dry Comal, and Blanco.

As these streams cross over the recharge zone of the aquifer, almost all of the baseflows and large parts of the flood flows of these streams flow down into the aquifer through faults in the streambeds The water then continues to travel south from the recharge areas into the artesian (confined) part of the aquifer and then from west to east and northeast until it erupts at springs located along the aquifer's eastern edge. The Comal Springs at New Braunfels and the San Marcos Springs at San Marcos are the largest of these springs.

The water in the aquifer can move very easily where the size and number of solution openings are large and connected with few restrictions. Movement rates of more that 2,100 feet per day have been measured over short distances. As a comparison, a movement rate of one foot per day is generally considered very fast in other aquifers in Texas. Because of the porosity and drop in elevation from the west end of the aquifer to the east, the water in the aquifer has a general directional flow from west to south to east and a relatively rapid current.

The aquifer is confined between impervious layers of rock and slants from a higher elevation in the west to a lower one in the east. This slant and rapid recharge provide a general directional flow of southwest to northeast through the confines of the aquifer's geologic formation. Additionally, this creates great artesian pressure resulting in several springs. Many of these springs contribute significantly to surface streamflows and aquatic and wildlife habitat in the Edwards Underground River itself and at or near the San Marcos and Comal Springs.

Edwards Aquifer is an Underground River. Under Texas law, percolating groundwater is owned by the overlying landowner, subject to the common law rule of capture. *Houston & T.C. Ry. Company v. East*, 98 Tex. 146, 81 S. W. 279 (1904). In the East case, the court considered the occurrence, movement, and usage of percolating ground water to be such a mystery, that a no liability rule was justified because the effects of a person's groundwater use on another's property was unknowable. Groundwater flowing in definite underground streams, however, is governed by surface water law and is subject to prior appropriation. *Pecos County WCID No. 1 v. Williams*, 271 S.W.2d 503, 506 (Tex. Civ. App.-El Paso 1954, writ ref'd n.r.e.); *Texas Company v. Burkett*, 117 Tex. 16, 296 S.W. 273, 278 (1927); *Bartley v. Sone*, 527 S.W.2d 754, 760 (Texas Civ. App.-San Antonio 1974, writ ref'd n.r.e.; see, also, the Tex. Water Code, §52.001, defining groundwater subject to private ownership not to include "defined subterranean streams").

State water, whether in surface or subsurface streams, is subject to regulation by the Texas Water Commission in accordance with the Texas Water Code, Chapter 11 Any authorization to divert and use state water is a right of use, and actual ownership of the water remains with the state, held in trust for the public's benefit *South Texas Water Company v Bien*, 247 S.W 2d 268 (Civ App 1952)

Texas caselaw provides that an underground stream is state water if it has the same characteristics of a surface watercourse See, e.g., *A H Denis, III, et al v Kickapoo Land Company, et al*, 771 S W 2d 235, 236-237 (Tex App -Austin 1989, writ denied) Those characteristics include a stream which has known and well-defined boundaries which contain the flow of the water; a known and well-defined source of water, a flow or movement of the water (i e , current) in a known direction; a known destination for the flow of the water; and is of sufficient volume or magnitude (e.i., utility) to be put to beneficial use See, e.g., *Hoeffs v Short*, 273 S W 785 787 (Tex. 1925); *Pecos County WCID Number 1, supra*, at 506.

Additional guidance may be obtained by other jurisdictions than Texas courts regarding the characteristics of underground streams The Florida Supreme Court found, for example, that water flowing below the surface of the land is also an underground stream if it can support fish and other aquatic wildlife *Tampa Water Works Company v Cline*, 37 Fla 586, 588 (1896).

A large body of knowledge has been developed and accumulated over many years with regard to the physical characteristics and use of the Edwards Aquifer as well as its direct hydrologic interrelation with the surface waters of the Nueces, San Antonio, and Guadalupe River Basins. After thorough examination and consideration of all available studies, reports, and information, the commission concludes that the Southern, or Balcones Fault Zone, portion of the Edwards Aquifer exhibits all of the characteristics of an underground river

Defined and Known Boundaries: The Edwards and Associated Limestones (Balcones Fault Zone) aquifer occurs as a narrow, arcuate band, 5-40 miles wide, which stretches 175 miles from a hydro-geologic division near Brackettville in Kinney County eastward through San Antonio and then northward through San Marcos to a hydrogeologic divide near the City of Kyle in Hays County This hydrogeologic divide, which serves as the northern-most boundary of the San Antonio segment of the aquifer, coincides approximately with the divide between the Colorado and Guadalupe River Basins. The aquifer occurs in the Balcones Fault Zone, which follows the same general east to northeast trend. The Edwards Aquifer is underlain by the relatively impermeable Upper Member of the Glen Rose Formation which serves as an aquitard. The aquifer dips to the south and southeast and occurs under artesian conditions where it is confined by the overlying Del Rio Clay. The aquifer is bounded to the north and northwest by the updip limit of its outcrop at the surface, which is its recharge zone. It is bounded to the south and southeast by the downdip limit of fresh water defined as 1,000 milligrams per liter of dissolved solids, known as the "bad water line."

The Edwards Aquifer in this area possesses known and defined boundaries and the water in the aquifer is contained within a well defined subterranean zone with confinement above and below by aquitards and confined laterally by hydrologic barriers. The fact that the Edwards Aquifer has many channels through which water flows is analogous to braided surface streams and delta areas.

Water Source: The Edwards Aquifer receives inflow primarily from state water flowing in surface streams which cross the outcrop of the aquifer (i.e., its recharge zone) and lose a portion of their flow to the permeable rocks of the aquifer that are exposed at the surface. Approximately 80% of the aquifer's recharge is from these surface stream losses. Approximately 5.0-6.0% of the recharge is from the deeper Glen Rose aquifer. The remainder of the recharge is from percolation and recharge to solution cavities in the interstream areas.

Current and Direction of Flow: The hydrogeologic characteristics of the Edwards Aquifer makes this water resource unique in the State of Texas. Through its "recharge zone," the Edwards Aquifer captures and diverts flows of major surface streams in the upper portions of the Nueces and San Antonio River Basins. These surface streams provide approximately 80% of the "recharge" to the aquifer. Water "recharging" the aquifer continues to flow downgradient, generally moving west to east to northeast, through the confined and known boundaries of the aquifer, eventually erupting at several springs.

Destination: Water flowing through the aquifer once again flows in surface streams by emerging at several springs, including the Leona River Springs near Uvalde, San Antonio and San Pedro Springs in San Antonio, Comal Springs in New Braunfels, Hueco Springs in the Guadalupe River near New Braunfels, and San Marcos Springs in San Marcos. Water from these springs continues to flow in the Nueces, San Antonio, and Guadalupe River Basins and contribute to freshwater inflows for bays and estuaries along the Gulf of Mexico.

Aquatic Habitat: The Edwards Aquifer supports unique fish and other aquatic species and their habitat, both within the aquifer in the subsurface and through year-round discharge to the major natural springs. Records of the Guadalupe River drainage indicates the presence of 75 different species of fish occurring in the river basin. While there are many unique species found in the basin, three of the more prominent include the San Marcos gambusia, Fountain darter, and the Guadalupe bass. Approximately 40 species of aquatic plants have been reported to be found in the basin, including the endemic species Texas wild rice. The aquifer itself provides habitat for several rare and endangered species of blind salamanders and two species of blind catfish. Blind catfish have been reported in the aquifer as deep as 2,000 feet below the land surface.

Utility: The Edwards Aquifer is also "of sufficient magnitude and volume to be serviceable to the persons through or along whose land it flows." The Edwards Aquifer is of great economic importance both to the region that relies upon it and to the State of Texas. The Edwards Aquifer is the sole source of water supply for approximately 1.5 million citizens in the San Antonio region and supports a diverse regional economy that provides employment for approximately 700,000 to 800,000 Texans. The Edwards Underground River also supports approximately 90,000 irrigated acres and the related agricultural economy. Additionally, the Edwards Aquifer is important to the economies of the communities at and downstream of several springs fed by the aquifer. These springs include the state's two largest natural springs at New Braunfels and San Marcos. These two springs sustain a significant tourist and recreational economy for these cities.

It is estimated that spring flow from Comal and San Marcos Springs alone provides 21 to 32% of the total annual flow, and up to 70% of the total flow during droughts, of the Guadalupe River at Victoria. Seventy to eighty thousand jobs exist in those counties that are supplied with water from the Guadalupe River below these springs. The economies of Hays and Comal Counties and the counties downstream of the springs are clearly dependent on the Edwards Aquifer.

Continuity: An implicit criteria for a water course is continuity. Hutchins, *Selected Problems in the Law of Water Rights in the West*, (1942) page 17. The Edwards Aquifer provides a continuity of flow of water between the point at which surface streams feed it and the points from which the water flows into surface streams. The essential feature is continuity of flow of water and not changes in character of the channel while the water is being conveyed underground. An analogy to a surface stream would be a swampy place in a stream, or where a stream enters a meadow in one channel and leaves it in another, there being no definite channel across the meadow. Nor is continuity broken by changes in the character of the channels which do not permanently interrupt the flow of water.

The commission has the authority to determine that the Southern Edwards Aquifer is an underground river and is, thus, state water subject to commission regulation. In the day-to-day exercise of its statutory powers and duties concerning state water, the commission must determine what waters are state waters. The legislature has granted the commission that power. The Texas Water Code, §5.102(a). This authority has been previously exercised and upheld by the Texas Supreme Court. *In re The Adjudication of Water Rights of the Lower Guadalupe River Segment*, 730 S.W. 2d 64 (Tex. App.-Corpus Christi 1987), writ ref'd, n.r.e., *per curiam*, 749 S.W. 2d 771 (Tex. 1988). In this case, the owner of the bed of a lake asserted that its waters were diffuse surface waters, which, like percolating groundwater, are the property of the landowner. The commission determined that the waters were state waters as defined by the Texas Water Code, §11.021, just as the commission has determined that waters of the Edwards Aquifer are state waters. TWC's determination was upheld by the Texas Supreme Court.

The legislature has not excepted the Edwards Aquifer from its general grant of power to the commission to determine what water are state waters. Nor has the state granted any title or right of use for the use of state water in the Edwards Aquifer. In some enactments relating to the Edwards Aquifer, the legislature may have assumed that it contained percolating groundwater, but it neither made a determination that it was such nor denied authority to the commission to determine its character.

Nothing contained in the Texas Water Code, §11.023(d) is inconsistent with the finding of the Edwards Aquifer as an underground stream. This provision states that water sinking into the ground to recharge the Edwards Aquifer is "considered" percolating groundwater. This percolating groundwater is much like diffused surface flow before it enters a stream. The commission believes that once percolating groundwater enters a surface or underground stream, however, the water becomes state-owned water. This position is supported by court decisions contained in *Hoefs v Short*, 273 S W 785 (Tex 1925 and *In re Adjudication of Water Rights of Lower Guadalupe River Segment*, 730 S W 2d 64 (Civ. App. 1987) ref n.r.e. reh. den'd

The enabling acts of the Edwards Underground Water District and the Medina County Underground Water District may contain the presumption that the Edwards Aquifer is "groundwater," but the acts do not make a specific legislative finding that the Edwards Aquifer is privately owned groundwater, rather than state-owned groundwater. Additionally, such presumption is rebuttable and not controlling upon a determination by TWC that the Edwards Aquifer legally constitutes state-owned water. Within the Medina County district, there exists subsurface water other than the Edwards Underground River which the district may regulate. Also, the powers granted to the Edwards Underground Water District are not the same and are not in irreconcilable conflict with those provided to TWC.

No order or decision of TWC, its predecessor agencies, or of the courts have ever specifically addressed the issue of whether the Edwards Aquifer legally constitutes "groundwater" or an underground stream. In discussion of the Edwards Aquifer in these orders and decisions, the presumption, but not the determination, has been that the Edwards Aquifer is "groundwater." Such presumption is rebuttable and presumptions contained in *dicta* are not controlling or binding upon TWC. Additionally, nothing prevents TWC from repealing or amending any of its previous orders based upon new information.

Finally, although a few claims filed under the Adjudication Act discuss the use of the Edwards Aquifer, none make claim to its use as state water as state water under the Adjudication Act. Therefore, it remains the opinion of TWC that no claims to the use of the Edwards Aquifer were ever filed.

The Texas Water Code, Chapter 11. The Water Rights Adjudication Act (the Act), Texas Water Code, Chapter 11, Subchapter G, provides, in part, that a person claiming a right to use state water must have filed with a sworn claim or certified filing evidencing such use not later than September 1, 1969. The Act does not apply to certain domestic and livestock use. To be recognized, a claim had to be based on actual beneficial use for the period from 1963 to 1967. The use period was extended to 1970 for projects under construction at the time the Act was passed. Failure to file the required sworn statement "extinguishes and bars any claim of water rights."

Any remaining state water not appropriated under the Act is available for appropriation with certain limitations through a permitting process administered by the commission pursuant to the Texas Water Code, Chapter 11, Subchapter D. Such limitations include, but are not limited to, restrictions on the diversion and use of water for the protection of water rights, water quality, aquatic and wildlife habitat, instream uses, and bays and estuaries. Additionally, a water right is limited to that amount which can be beneficially used without waste for the authorized purpose but not to exceed the amount authorized.

Based upon the erroneous presumption that water contained in the Edwards Aquifer is percolating groundwater and, thus, private water, no known claims for the use of state water from the Edwards Aquifer were filed under the Act. Consequently, no right to use state water from the Edwards Aquifer has been adjudicated. Since the Edwards Underground River is state water, the right to use water in the underground river is subject to appropriation by permit issued by the commission, except for exempt domestic and livestock purposes, in accordance with the Texas Water Code, §§11.121 et seq. The commission may reserve from appropriation all or a portion of the water rights vested in the state to satisfy the state's obligation to protect water quality, the public health, safety, and welfare, aquatic and wildlife habitat, instream uses, bays and estuaries, and any other public purpose.

Some commenters have stated that it is unclear whether the Act applies to underground streams as well as to surface streams. This is a judicial issue and has not been decided. If the Act is construed as applicable to underground streams, claims to such waters are now barred by the terms of the Act. If, however, the Act is construed as not applicable to underground streams, the Act would not be a bar to assertion in court of non-statutory rights such as riparian rights. The commission expresses no opinion as to the validity of such claims.

Since water in the Edwards Aquifer is state water, commission regulation of the use of the Edwards Aquifer is not an unconstitutional taking of private water. Because waters of the Edwards Aquifer would be unappropriated state waters, constitutional provisions relating to the taking of private water would not apply. Texas Constitution Article XVI, §59; *See, also, In re Adjudication of Water Rights of the Upper Guadalupe Segment*, 642 S.W.2d 438 (Tex. 1982).

The commission is not authorized to recognize any equitable rights to the use of state water based upon the erroneous presumption of percolating groundwater and historical use. The failure to previously assert state ownership of the Edwards Aquifer does not grant any right to historical user of the Edwards Aquifer since the doctrine of laches does not apply to the state and a person may not adversely possess state property.

The commission's determination that the Southern Edwards Aquifer is an underground river does not impair property rights in violation of the United States Constitution or the Texas Constitution. This determination merely brings the Edwards Aquifer within the commission's jurisdiction. The conflict between the assumption by overlying landowners that the water beneath their lands was percolating and the commission's determination otherwise does not render the commission's action unconstitutional. Regulations based upon this determination could, of course, restrict withdrawal of water from beneath one's land. The same would be true of regulations of percolating groundwater such as those authorized by the legislature for underground water conservation districts pursuant to the Texas Water Code, Chapter 52.

There is no basis for belief by landowners that the rule of capture for percolating groundwater makes them immune to reasonable, non-discriminatory and non-confiscatory regulation in the public interest. The rules contained in this chapter would satisfy constitutional requirements governing regulation of percolating groundwater. Existing historical uses of the Edwards Aquifer are recognized. These rules also benefit landowners by protecting the aquifer from the deleterious of overdrafting.

The Texas Water Code, Chapter 26. In addition to the authority contained in the Texas Water Code, Chapter 11, the Texas Water Code, Chapter 26 authorizes the commission to issue orders, make and enforce rules, and do all other necessary things for the protection of the water quality of all water above and below the surface of the land. Rules promulgated pursuant to this chapter may provide for the restriction of pumpage for this purpose. Water quality rules requiring pollution abatement plans for any development over the aquifer to protect recharge features already exist under Chapter 313 of the rules of the commission. The regulation of the use of water from the Edwards Aquifer to protect water quality in accordance with the Texas Water Code, Chapter 26, is a valid exercise of the "police powers" of the state necessary to protect the public health, safety, and welfare.

Enabling Act: Edwards Underground Water District. Section 3 of the Edwards Underground Water District's enabling act, Texas Civil Statutes, Article 8280-219 (Texas Auxiliary Water Laws 1982), provides that the district must develop, implement, and enforce a drought management plan "in order to minimize, as far as practicable, the drawdown of the water table or the reduction of artesian pressure and spring flow; to prevent waste; and to protect the groundwater resource from serious harm." The legislation requires the plan to contain objective standards for determining when drought conditions exist, specific drought management activities for the stages of drought, and requirements for reducing water use "in accordance with established priorities, which must include uses for essential human needs, agricultural, industrial, power, recreational, commercial, and other categories of use." If the district fails to timely adopt a plan in accordance with the statute, TWC is authorized to develop and implement a plan.

The Act also provides that a person can appeal the reasonableness and validity of a rule under the district's plan to the Texas Water Commission. Pursuant to TWC procedural rules contained in 31 TAC §§275.91 et seq. relating to such appeals, the definition of "person" with a right to appeal includes the TWC executive director and public interest counsel. One may argue that fatal weaknesses exist in the district's present plan and rules, including triggering conditions tied to both aquifer level and rainfall; the absence of water conservation requirements; the unequal application of the rules; the inadequacy of the rules to achieve the statutory goals, and the irreconcilable conflict with federal laws for the protection of endangered species. All such weaknesses are designated grounds for appeal under commission rules.

The preamble for the adoption of these rules further provides that nothing in the rules shall be construed as a determination by the commission that the district did timely develop a drought management plan that adequately meets all statutory requirements and, thus, constitutes a regional plan as contemplated by §3 of the enabling Act. Because of the de-annexation of Medina and Uvalde Counties from the district, the district's plan does not apply to all necessary portions of the aquifer and, therefore, cannot constitute a plan as contemplated by the enabling Act even if amended to address its many weaknesses.

The Texas Water Code, §11.202. Finally, the Texas Legislature recently amended the Texas Water Code, §11.202, to provide a moratorium on the drilling of any new artesian well producing 5,000 gallons per minute or more in the southern portion of the Edwards Aquifer unless authorized by TWC. Such authorization may be granted by the commission if the applicant can demonstrate that only a beneficial use of the water will be made and no waste will occur. The commission is authorized to delegate this regulatory power to a local district.

This prohibition does not apply to wells which were drilled and producing water prior to September 1, 1991. Additionally, the statute does not apply to wells drilled after December 31, 1993.

Comments Regarding Specific Rules. With respect to §298.1 of the proposed rules, one commenter stated that there is no specific reference to, or provision for, protection of endangered species, which is the major issue involved in the pending federal endangered species lawsuit in Midland. The commenter suggested that the commission should make the protection of endangered species a specific objective of the proposed rules. The commission disagrees in part with this comment. The commission's primary objective in the promulgation of these rules is to implement a water management plan that considare all demands on the aquifer, not just those that have led to lawsuits under the federal Endangered Species Act. In response to the comment, the proposed section is amended to provide clarification of the commission's goals and policies to be achieved through the management of the Southern, or Balcones Fault Zone, portion of the Edwards Aquifer. Those purposes include the achievement of water conservation; the maximization of the beneficial use of water available for diversion from the underground river; protection of the water quality of the Edwards Underground River and related surface streams; the protection of the public health, safety, and welfare; the protection of aquatic and wildlife habitat; and to provide for instream uses and bays and estuaries in accordance with the Texas Water Code, Chapters 11 and 26 and other applicable laws.

The commission's response to comments in opposition to the finding of the Southern, or Balcones Fault Zone, portion of the Edwards Aquifer as an underground river and, thus, state water subject to commission regulation, as contained in §298.2 of the rules, is provided previously under. General Commentary Underground River Determination." Minor changes to the proposed rules seek to clarify the commission's position as to the applicability of the rules to the Southern Edwards Aquifer.

With respect to proposed §298.2 of the rules, several commenters stated that regulation of the Edwards Aquifer as state water under the Texas Water Code, Chapter 11, through water rights permits dated 1992, would cause significant uncertainty for all users of the aquifer. Specifically, under the doctrine of first in time, first in right, all water rights issued pursuant to the commission's proposed rules would be subordinate to existing water right permits to divert water from rivers below the springs of the Edwards Aquifer. The commission intends to manage the Edwards Underground River water rights so that they are not subordinate or superior to any downstream water rights.

In response to requests for clarification as to the applicability of rules to the southern portion of the Edwards Aquifer, the commission amends proposed §298.4 to provide that these rules shall not be applied to any other aquifer in the State of Texas.

With regard to proposed §298.5 relating to the boundaries of the Edwards Underground River, several commenters stated that the boundaries are not fixed, due to the movement of the bad water line. In response, the commission states that, much like a surface stream, the Edwards Underground River itself moves within the boundaries of its "banks," i.e., the boundaries provided by commission orders.

Several comments relating to proposed §298.7, providing definitions for terms used in this chapter, stated that the exact language in definitions for these terms contained in Chapter 297 of the commission's rules applicable to the diversion and use of surface water, should also apply to the use of water in the Edwards Underground River. The commission agrees that generally, those existing rules of the commission that apply to the diversion and use of state water from surface streams are applicable to the diversion and use of state water from the Edwards Underground River, except where necessary to reflect the unique nature of the subsurface source of the water. Changes to the definitions of the terms "beneficial use," "conservation," "domestic use," "municipal use," and "industrial use" represent current agency usage of these terms and do not constitute a substantive change in the meaning of these terms or how they are applied by the commission.

Comments were received stating that the definition of per capita use failed to make clear that the total actual population served was a factor. The commission agrees that such clarification is needed and amends the definition accordingly.

With respect to §298.11 of the proposed rules, providing for the requirement of a permit to the use of diversion of state water contained in the Edwards Underground River, several comments were received regarding the impracticability of the requirement that applications by an existing user of the Edwards Underground River submit the application on or before September 1, 1992. The commission agrees with these comments and amends proposed §298.11 to provide for a deadline of November 1, 1992, for the submission of this document.

Accordingly, the commission further amends §298.11 to provide that each application by an existing user received by the commission on or before November 1, 1992 shall be deemed to be accepted for filing on November 1, 1992, for purposes of time priority, if by that date, the application is postmarked or actually received by the commission on or before November 1, 1992, and the application maps and other submitted materials are in substantial compliance with requirements of this chapter. The commission further amends this section to provide that for purposes of this section, a declaration of historical use provided by §298.14 of this chapter, shall constitute an application for a permit to divert and use water from the Edwards Underground River.

Additionally, in order to avoid any unnecessary time or expense on the part of the applicant, should the legislature enact legislation providing for the management of the Edwards Underground River by an entity other than the Texas Water Commission, this section is further amended to provide that applications shall be deemed acceptable for filing without containing a water conservation plan if such plan and all necessary application fees are subsequently submitted on or before June 1, 1993. This delay is to provide the legislature adequate time to enact such legislation.

Finally, provisions contained in proposed §298.11 providing that permits may contain such limitations as necessary to achieve conservation, prevent waste, and to maintain or protect adequate spring flows in the Comal and San Marcos Springs, the protection of water quality, the protection of health, safety, and welfare, aquatic and wildlife habitat, instream uses, and bays and estuaries, have been deleted as redundant of §§298.16, 298.17, 298.40, 298. 41, and 298.52 of the rules.

With respect to proposed §298.11 one commenter suggested that rules should specify that the time priority of appropriation applies only between users of the Edwards Underground River and not between underground river users and water right holders on surface rivers below springs of the Edwards Underground River. Furthermore, the commenter recommended that rules should specify that permits for existing users shall be granted in perpetuity up to the amount of water which the commission has determined to be available for appropriation. Finally, this commenter recommended that permits granted by the commission under these rules should not be subject to any curtailment. It is the intent of the commission to administer the water rights from the Edwards Underground River so that they are neither superior nor subordinate to water rights to surface streams. Generally, water rights to the Edwards Underground River shall be issued without term, subject to limitation, cancellation, and forfeiture pursuant to the Texas Water Code, Chapter 11, Subchapter E. §§11 171 et seq, and other applicable law and subject to curtailment to meet use reduction goals established by this chapter.

With respect to proposed §298.12 of the rules, providing a permit exemption for certain domestic and livestock uses, several commenters recommended that a provision be added requiring that such a well exempted from permitting be required to register with the commission to ensure compliance with §298.12 and to provide the commission with necessary information for the development and implementation of a management plan. The commission agrees with these comments and has amended proposed §298.12 by adding subsection (d) providing that a person owning a well and claiming exemption for such well under §298.12 must register with the commission the ownership, location, depth, size, diameter, and maximum pumpage capacity in gallons per minute of the well. Subsection (d) also provides that such registration must be submitted to the commission on or before September 1, 1993, or 30 days after completion of the well, whichever is later. Finally, the subsection provides that changes in any information contained in the registration must be filed with the commission not later than 30 days after the change.

In regard to proposed §298.12, one commenter stated that the exemption for domestic and livestock use should be limited to wells that will not produce more than 25,000 gallons of water per day. The commission disagrees with this comment. This limitation is inapplicable to permit exemptions provided for the use of state water pursuant to the Texas Water Code, §11. 142. Rather, the requested limitation is applicable to permit exemption for the use of groundwater pursuant to the Texas Water Code, Chapter 52, relating to underground water conservation districts.

With respect to §298.13 of the proposed rules, one commenter suggested that, in some cases, wells that were under construction or recently completed as of April 15, 1992, investment decisions to build these projects were made under presumption that water contained in the Edwards Aquifer was privately-owned ground water. These commenters further provided that these projects probably would not have been constructed had the commission's emergency rules and proposed permit rules been in existence at the time the decisions were made. This commenter requests that wells under construction prior to April 15, 1992, be allowed to be completed and furthermore, be allowed to be operated under interim authorization for a three-year period under which to establish historical actual use of the well. This commenter further provided that this is consistent with the treatment of diversion works under construction in the Water Rights Adjudication Act provided in the Texas Water Code, §11.303. The commission disagrees with the proposed revisions. The prohibition on new wells is to prevent speculative drilling. The rules provide that new wells may be constructed if they are replacement or backup wells. Additionally, a person may realize his investment in the commencement of a new well through the transfer of a water right to the new well.

With respect to proposed §298.14 of the rules, one commenter stated that information required to be provided in the declaration of historical use is already submitted with the submission of well log by the driller of the well, pursuant to the rules of the Texas Water Well Drillers Board. The commission respectfully disagrees with the comment. Well logs required to be filed with the commission pursuant to the rules of the Texas Water Well Drillers Board do not require, for example, the date of first withdrawal and beneficial use of water from the well.

Additionally, the logs do not provide the volume of water diverted by each well during each calendar year since January 1, 1982, nor do the logs contain other information relating to the use of the water and the location of such use. Finally, the commission believes that the requirement of the declaration of historical use should be that of the owner of the well and should not be placed upon the driller of the well.

Changes by the commission to proposed §298.14 seek to eliminate any redundancy in the filing of a seperate application for permit for a well from an existing user by providing that a declaration of historical use shall constitute an application for a permit if a water conservation plan and application fees are subsequently and timely submitted in accordance with rules of this chapter. Amendments to the proposed rule also provide that failure to timely file a declaration of historical use or water conservation plan and fees in accordance with the chapter shall result in the immediate termination of the interim authorization granted by §298.13 of the chapter.

Finally, changes to proposed §298.14 provide that a person whose interim authorization has been terminated pursuant to this section, must submit an application for a new use pursuant to §298.11(d) and have such application approved by the commission before the person is authorized again to divert and use water from the Edwards Underground River.

The commission also amends proposed subsection (b) of §298.14 to provide that each declaration of historical use shall include all supporting documentation to the information contained in the declaration of historical use. Proposed §298.14 is also amended to provide that the declaration of historical use may contain information relevant to all wells owned by the declarant.

One commenter stated that the requirement contained in §298.14 providing the latitude and longitude of the well was unnecessary for the purposes of the declaration of historical use. The commission agrees with this comment and has amended the section to provide that the location of the well shall be described by the distance and direction from the nearest survey corner.

The commenter further stated that the requirement contained in proposed §298.14 providing that statements contained in the declaration of historical use be based on personal knowledge of the person making the sworn statement may be, in several instances, difficult, if not impossible, to obtain. The commission agrees with this comment and has amended this section to provide that statements contained in the declaration of historical use may be based on the personal knowledge of the person making the sworn statement or the best and most complete available records in the custody of the declarant and that such statements are true and correct to the best of that person's knowledge or recollection.

With respect to proposed rules contained in §298.7 and §298.14, relating to the definition of authorized well and interim authorization, respectively, several commenters stated that wells that were under construction on April 15, 1992, should be considered authorized wells. The reason for this recommendation is that the investment decisions to build such wells had been made prior to April 15, 1992, under the erroneous presumption that water contained in the Edwards Underground River was privately owned percolating ground water. The commission respectfully disagrees with this comment. The limitation on new wells is necessary to prevent speculative usage and provide the commission an opportunity to evaluate existing claims against the amount of water available for diversion. Persons who have invested in the construction of new wells may realize their investment through the purchase or transfer of existing water rights.

The commission received several comments with respect to proposed §298.15, providing that a water conservation plan be submitted with an application for permit to use and divert water from the Edwards Underground River. Many of the comments stated that the development of the water conservation plan constituted a substantial expenditure in time, money, and resources on the part of the applicant.

The requirement that a water conservation plan be submitted by a water right applicant is provided by the Texas Water Code, §11.127. The rule provides that the same requirements made of applicants for the use of surface water apply to applicants for the use of water from the Edwards Underground River.

With regard to proposed §298.15 providing for the requirement of a water conservation plan, one commenter stated that the plans for existing users should not be required when permit applications are filed because of the time and expense required to evaluate conservation and reuse potential and prepare plans in accordance with the requirements of commission rules. This commenter recommended that six months following the deadline for filing permit application by existing users would be a reasonable deadline for filing a conservation plan. The proposed rule has been amended to allow for the delayed submission of an applicant's water conservation plan until June 1, 1993.

One comment regarding proposed §298.15 provided that the conservation plan should not require a permit applicant to submit information regarding alternative sources of water supply to the Edwards Aquifer. The commission agrees and has made this a requirement of the water management plan that must be submitted by persons authorized to use more than 1,500 acre-feet per year.

With regard to proposed §298.16, several comments were submitted recommending that the rule should provide more specific criteria for the commission to follow in acting on a permit application. The commission agrees with this comment and has amended this section. The rules provide that a water right may be issued for an amount of water equal to the maximum amount beneficially used without waste in any single calender year between January 1, 1982-April 15, 1992, but not less than the average annual amount of water actually and beneficially used without waste over the same period.

Other comments submitted in relation to proposed §298.16 stated that the mandatory per capita water use goal of 120 gallons per capita per day may be unreasonable since it does not take into consideration the applicant's unique circumstances and patterns of water use. The commission is in general agreement with this comment and has deleted this requirement.

One commenter stated that the rules contained in proposed §298.16 would allow the commission to impose any water conservation measure as a condition of a permit. This commenter recommended that the commission should approve an applicant's conservation plan unless it finds that the plan does not demonstrate that reasonable diligence will be used to avoid waste and achieve water conservation. This commenter further added that this is the standard applied to other permittees pursuant to commission rules relating to surface water use and contained in Chapter 295 relating to the use of surface water. The commission respectfully disagrees with this comment. Provisions contained in the Texas Water Code, §11.1271, specifically provide that the commission may require the formulation and submission of a water conservation plan and the adoption of reasonable water conservation measures. Pursuant to this section, the commission currently requires, pursuant to permit condition, the implementation of water conservation measures. No rule of the commission or statute contained in the Texas Water Code limits the commission's review and approval of the water conservation plan as suggested by the commenter.

With respect to the minimum irrigation system performance standards provided by proposed §298.16, several commenters stated that the percentage efficiency requirements for certain irrigation systems were unsubstantiated and were unworkable and should be replaced with a water duty of, for example two acre-feet per acre. The commission disagrees with this comment but has amended the rule to provide for a case-by-case analysis of water systems and use.

With respect to proposed §298.23, relating to an application by a city or a town to acquire the use of water from another water right holder without compensation pursuant to the Wagstaff Act, one commenter stated that this rule proposes to modify and limit a city's power under the Act. Furthermore, the commenter stated that this provision does not apply to any city in Texas outside the Edwards Aquifer region. The commenter recommended that in order to ensure that the cities over the Edwards Aquifer are treated similarly to all other cities in the state, this provision should be deleted. The commission disagrees with the comment. This statutory provision currently applies statewide and this rule does not exclude its applicability to areas outside the area over the Edwards Underground River.

A comment was received requesting a definition for non-essential uses as provided in proposed §298.23. The commission agrees with this request and has provided in §298.23 that the term means aesthetic or recreational use or water such as pools, spas, ornamental fountains, landscaping, residential lawns, ornamental trees and shrubs, artificial or augmented waterways, water gardens and parks, automobile and machinery washing, or municipal uses not necessary for the protection of the public health, safety, and welfare.

With respect to proposed §298.31, requiring a water use measurement device to be put on every well with the exception of domestic and livestock wells, several commenters recommended that water use measurement requirements should apply to all wells to ensure compliance with all provisions contained in this chapter. In response, the commission states that the small use by these wells may be adequately monitored by examining the purpose and location of use.

Comments regarding §298.32 included a recommendation that reports be filed by all well owners and not just owners of permitted wells. In response to these comments, the commission would note that the commission is not authorized to require such water use reports from exempt domestic and livestock users pursuant to the Texas Water Code, §11.031 and §11.207.

With respect to provisions contained in proposed §298.42 and §298.51, one commenter recommended that water rights granted by the commission should not be subject to curtailment. The commission respectfully disagrees with this comment. Any authorization to divert and usestate water is a right of use and actual ownership of the water remains with the state held in trust for the public benefit. Pursuant to its authority to administer water rights, the commission may reserve from appropriation state water necessary to protect water quality, aquatic and wildlife habitat, instream uses, bays and estuaries, and other public purposes.

With respect to proposed §298.42, the commission rule providing for the limitation of diversions to protect water quality, public health, safety, and welfare, aquatic and wildlife habitat, instream uses, bays and estuaries, and public purposes, several commenters provided that more clarification is needed in these rules as to the necessary limitations on the overall diversion from the aquifer to achieve these purposes. The commission agrees with this comment and amends proposed §298.42 to provide that, except as provided by §298.51, concerning emergency limitations, for the period ending December 31, 2007, the total authorized amount of direct diversions from the Edwards Underground River shall not exceed 450,000 acre-feet of water per year. This section has been further amended to provide that, except as provided by §298.51, for the period beginning January 1, 2008, the total authorized amount of direct diversions from the Edwards Underground River shall not exceed 400,000 acre-feet of water per year. Finally, this section is amended to provide that when the level of the Edwards Underground River is equal to or greater than 665 above mean sea level as measured at the J-17 index well, the commission may authorize the direct diversion on an interruptible basis of additional amounts above the limitation contained in subsections (b) and (c) of this section, but not to initially exceed 88,000 acre-feet per year.

Furthermore, in response to this comment, proposed §298.51 is amended to provide that in order to protect spring flows from the Comal and San Marcos Springs during a drought, so that aquatic and wildlife habitat may be protected in accordance with applicable law, the total authorized amount of water which may be directly diverted from the Edwards Underground River may at any time be limited to no more than 350,000 acre-feet if the Edwards Underground River dropped to a level of 625 feet above mean sea level as measured at the J-17 index well. This section further provides that such reduction shall be achieved by the temporary curtailment of uses non-essential for the protection of the public health, safety, and welfare, including, but not limited to, recreational and aesthetic uses through the implementation of permittee's drought management plans and/or the purchase or lease of other's water rights to divert water from the Edwards Underground River. The commission further amends proposed §298.51 to provide that the executive director shall notify the Texas Parks and Wildlife Department and the United States Fish and Wildlife Service immediately upon the implementation of the emergency section, and shall consult with these agencies in determining any recommendations to the commission concerning actions taken in response to the emergency.

Several commenters stated that in order to protect federally listed threatened and endangered species in the aquifer at and near Comal and San Marcos Springs during a repeat of the worst drought of record during the 1950s, total diversions from the Southern Edwards Aquifer should not exceed approximately 200,000 acre feet a year or that the aquifer level could not drop below 632 feet above mean sea level as measured at the J-17 index well and corresponding to the highest elevation of springs of Comal Springs. The commission has extensively studied meteorological records and determined that the drought of the 1950s was a catastrophic event with a 200-500 year anticipated frequency. The commission believes that these rules provide adequate protection for aquatic and wildlife habitat. Subject to public notice and comment, the commission may consider modification of the pumpage limitation as additional hydrologic and other studies are performed and evaluated and will develop water management strategies that will provide additional protection for aquatic and wildlife habatat, if necessary.

With respect to proposed §298.42 and §298.51, one commenter stated that limitations on the use of the Edwards Aquifer should not be imposed until comprehensive studies have been performed determining the feasibility of artificially augmenting streamflow in order to protect endangered species. Various individuals and groups have suggested that minimum flows at Comal and San Marcos Springs could be guaranteed by means other than reducing water withdrawals from the Edwards Aquifer.

One suggestion would involve moving water from one point in the Aquifer to another to protect endangered species, then maintain adequate flows for downstream uses. If feasible, this would enable the Aquifer to be overdrafted during periods of low recharge, thereby increasing the average yield of the aquifer. Another idea would involve pumping water from the Uvalde Pool to the San Antonio Pool in order to maintain hydrostatic pressure and enhance natural springflow.

Serious questions have been raised regarding the feasibility of augmenting or enhancing natural springflow by artificial means. The principal concern is that artificial augmentation, while protecting downstream water users, may not protect the habitat of endangered species in and near the springs and could potentially damage their habitat. Additionally, if the source for augmentation is the Edwards Underground River itself, augmentation may result in the impairment of users to economically withdraw water from the Edwards Underground River by the lowering of the aquifer level. Another concern is that a policy of overdrafting the Edwards Aquifer could lead to significant deterioration of water quality due to intrusion of poor quality ground water along the bad water line. Given the potential benefits and risks of spring flow augmentation and enhancement, the commission believes any such option should be fully studied and evaluated on an expedited basis. The commission supports the current studies being sponsored by the Texas Water Development Board regarding the feasibility of such springflow augmentation. The conduct and results of such studies should be held to rigorous standards of scientific peer review to insure credibility and validity Environmental organizations should also be provided the opportunity to participate in these studies.

With respect to proposed §298.61, relating to the delegation of responsibility, one comment provided that delegation of the commission's responsibilities should be allowed only in the event that a regional entity with jurisdiction over the entire Edwards Aquifer region is created. The commission agrees with this comment and clarifies language contained in proposed §298.61 by providing that upon request by water district authority or other political subdivisions of the state having all necessary power, authority, and jurisdiction necessary to implement the water management plan as provided in this chapter, the commission may delegate to that political subdivision any of the commission's responsibilities under such chapter, except to the extent that the delegation is prohibited by law.

In response to the general comments that management of Edwards Aquifer should be done by a local entity or entities, the commission strongly believes that its involvement in the management of the Edwards Aquifer should be exercised only as a last resort. The commission is in agreement with many of the commenters that local management is best. The commission supports the creation of a single regional district that is provided sufficient authority to develop, implement, and enforce a comprehensive and coordinated regional water management plan which provides for the conjunctive management of the region's surface and ground water.

With respect to proposed §298.71, providing for the creation of the South Central Texas Water Resources Advisory Council, several comments were submitted relating to the membership of the Advisory Council and the scope of issues in which the council is to address. Because the information to be provided by the advisory council and the issues it is to address are to be studied by the Texas Water Development Board through the implementation of the Trans-Texas Program in order to assist the board in the development of the state water plan pursuant to the Texas Water Code, §16.051 and §16.055, the commission finds the activities of the South Central Texas Water Resources Advisory Council to be redundant of the program of the Texas Water Development Board. Therefore, Subchapter H providing for the creation of the Advisory Council will be withdrawn.

The new sections are adopted under the Texas Water Code, §5.103 and §5. 105, which provides TWC with the authority to adopt rules necessary to carry out its duties and responsibilities under the Texas Water Code and other state law.

§298.1. Purpose. The purpose of this chapter is to provide for the determination and administration by the commission of the rights to divert and use state water from the Southern, or Balcones Fault Zone, portion of the Edwards Aquifer (Edwards Underground River) in order to : achieve water conservation; maximize the beneficial use of water available for diversion from the underground river, protect the water quality of the Edwards Underground River and related surface streams; protect the public health, safety, and welfare, protect aquatic and wildlife habitat; and provide for instream uses and bays and estuaries in accordance with the Texas Water Code, Chapters 11 and 26 and other applicable state law and rules of the commission.

§298.2 Edwards Aquifer is State Water

(a) The Southern, or Balcones Fault Zone, portion of the Edwards Aquifer (Edwards Underground River) is an underground stream and water contained therein is state water subject to commission regulation in accordance with the Texas Water Code, Chapter 11 and all other applicable law and rules of the commission relating to the commission's authority over water rights, including the issuance of water rights, water rights adjudication, cancellation of water rights, and the enforcement of water rights.

(b) No known claims of riparian water rights, claims under the Texas Water Code, §11.143, claims of water rights under the Irrigation Acts of 1889 and 1895, or any other claims of water rights expressly seeking authorization for the diversion and use of state water from the Edwards Underground River were filed and adjudicated pursuant to the Water Rights Adjudication Act, the Texas Water Code, §§11.301 et seq (the Act). Consequently, water from the Edwards Underground River is subject to appropriation by permit issued by the commission, except for exempt domestic and livestock purposes in accordance with the Texas Water Code, §§11.301 et seq.

(c) Any authorization to divert and use state water is a right of use, and actual ownership of the water remains with the state, held in trust for the public's benefit. Pursuant to its authority to administer water rights, the commission may reserve from appropriation state water necessary to protect water quality, aquatic and wildlife habitat, instream uses, bays and estuaries, and other public purposes.

(d) The designation of the Southern, or Balcones Fault Zone, portion of the Edwards Aquifer as an underground river is for the purposes provided in this chapter and shall not affect rules of the commission contained in Chapter 313 of this title (relating to Edwards Aquifer) and other applicable commission rules providing for the protection of the water quality of an aquifer designated as a sole or principal source aquifer as provided by 40 Code of Federal Regulations (CFR) Part 149, pursuant to the Safe Drinking Water Act, §§1442(e), 42 United States Code 300h-3(e).

§298.3. Applicability of Commission Rules. Except as specifically provided otherwise by this chapter, all commission rules relating to the application for and granting and enforcement of, permits for the diversion and use of state water including, but not limited to, Chapters 281, 295, 297, and 337 of this title (relating to Applications Processing, Water Rights Procedural, Water Rights Substantive, and Enforcement Generally) shall apply to the diversion and use of water from the Edwards Underground River. A provision contained in this chapter supersedes a rule outside this chapter to the extent of any conflict. A conflict exists only if the substance of the rule in this chapter and any related provision is irreconcilable with the substance of a rule outside this chapter.

§298.4. Applicability of Rules to Southern Portion of the Edwards Aquifer. The rules contained in this chapter specifically apply to that portion of the Edwards Aquifer described by §298.5 of this title (relating to Boundaries of the Edwards Underground River) and located in Kinney County east of the hydrologic division near Brackettville which separates flow in the Nueces River Basin from flow to the Rio Grande Basin, and in Uvalde, Medina, Atascosa, Bexar, Guadalupe, and Comal Counties and in Hays County south of the hydrologic division near Kyle which separates flow toward the San Marcos River from flow to the Colorado River Basin. These rules shall not be applied to any other aquifer in the State of Texas.

§298.5. Boundaries of the Edwards Underground River

(a) The lateral boundaries of the Edwards Underground River, as used in this chapter, are: on the north and northwest, the updip limit of the outcrop of the Edwards and Associated Limestones; on the south, the boundary south of which water moves at rates of flow that are insignificant compared to flow rates north of this boundary (for purposes of this chapter, this boundary is defined by the line known as the "bad-water line" which separates water containing less than 1,000 milligrams per liter of total dissolved solids from water containing more than this concentration of total dissolved solids as such line exists in its most southern known location after periods of sustained high water levels in the Edwards Underground River); on the west, the hydrologic division near Brackettville in Kinney County that separates underground flow toward the Comal and San Marcos Springs from underground flow to the Rio Grande Basin; on the east, the hydrologic division northeast of Kyle in Hays County that separates underground flow toward the Comal and San Marcos Springs from underground flow to the Colorado River Basin. The Edwards Underground River is underlain by the Upper Member of the Glen Rose formation and confined by the overlying Del Rio Clay.

(b) The lateral boundaries of the Edwards Underground River are approximately those boundaries of "Subdivision No. One of the Underground Water Reservoir in the Edwards Limestone Balcones Escarpment Area" defined by the Board of Water Engineers of the State of Texas, a predecessor of the Texas Water Commission, by order dated January 10, 1957, as modified by the Texas Water Commission by order dated April 18, 1988, and incorporated in this rule by reference. These orders are available for inspection at the office of the chief clerk of the commission in Austin during the commission's regular business hours.

§298.6. Effect of Invalidity of Rule. If any provision of any rule or its application to any person or circumstances is held invalid, the invalidity does not affect other provisions or applications of the rule which can be given effect without the invalid provision or application, and to this end the provisions of the rule are severable.

§298.7. Definitions. The following words and terms, when used in this chapter, shall have the following meanings, unless the context clearly indicates otherwise. The definitions contained in §297.1 of this title (relating to Water Rights, Substantive) apply to this chapter unless otherwise provided in this section.

Authorized well-A well which diverts water from the Edwards Underground River for which a permit has been issued by the commission, or temporary authorization granted pursuant to this chapter, or that is exempt for domestic and livestock purposes. All applicable rules must have been met, and such well must have been in compliance with all existing law relating to well construction, spacing, and other applicable law on or before April 15, 1992.

Beneficial use-The use of only that amount of water which is reasonable and necessary for a purpose authorized by law, when reasonable intelligence and reasonable diligence are used in applying the water to that purpose. Water which is wasted or inefficiently used because of, but not limited to, inefficient diversion works or distribution systems, excessive applications, excessive or unnecessary evaporation, transpiration, or seepage, the discharge or escape of water from a well into a surface stream or reservoir for on authorized beneficial purpose, or by pollution is not beneficially used.

Commission-The Texas Water Commission and any successor agency.

Conservation-

(A) the development of other water resources;

(B) those practices, techniques, and technologies that will reduce the consumption of water, eliminate the loss or waste of water, maximize the efficiency in the use of water, prevent the pollution of water, or increase the recycling and reuse of water so that the demand for water from the Edwards Underground River is reduced; and

(C) any other measure that would sustain or enhance the water supply to provide for future long-term needs

Diversion of water-Any act or failure to act that results in the taking of water from the Edwards Underground River by or through man-made facilities, including the pumping of wells or allowing waters to flow from artesian or other type wells.

Domestic use-Use of water by a person owning the well from which the water is withdrawn and by that person's household for drinking, washing, or culinary purposes; for irrigation of lawns or of a family garden and/or orchard for household consumption and the produce is not sold; and for watering of domestic animals not raised, maintained, or sold for commercial purposes. If the water is diverted, it must be diverted solely through the efforts of the user.

Edwards Aquifer or aquifer-That portion of an arcuate belt of porous, waterbearing, predominantly carbonate rocks known as the Edwards and Associated Limestones in the Balcones Fault Zone trending from west to east to northeast in Kinney, Uvalde, Medina, Atascosa, Bexar, Guadalupe, and Comal Counties, and in Hays County south of the hydrologic division near Kyle which separates flow toward the San Marcos River from flow to the Colorado River Basin; and composed of the Salmon Peak Limestone, McKnight Formation, West Nueces Formation, Devil's River Limestone, Person Formation, Kainer Formation, and Edwards Formation, the Georgetown Formation, and the Walnut Formation. The permeable aquifer units generally overlie the less-permeable Glen Rose Formation and underlie the less-permeable Del Rio Clay regionally. The lateral boundaries of the aquifer are as contained in §298.5 of this title (relating to Boundaries of the Edwards Underground River).

Edwards Underground River or underground river-The Edwards Aquifer as defined by this section and the boundaries of which are provided by §298.5 of this title.

Existing user-A person that has diverted and beneficially used water from the Edwards Underground River on or before April 15, 1992.

Industrial use-The use of water for or in connection with commercial or industrial activities, including, but not limited to, manufacturing, commercial feedlot operations, commercial fish production, bottling, brewing, food processing, scientific research and technology, recycling, production of concrete, asphalt, and cement, cooling tower heat exchange, commercial uses of water for tourism, entertainment, and hotel/motel lodging, generation of power other than hydro-electric, and other business activities.

Interruptible use-The additional diversion and use of water from the Edwards Underground River that may be allowed only when the level of the Edwards is above 665 feet above mean sea level as measured at the J-17 index well. Such use may be interrupted by the commission at any time the commission determines that spring flow at Comal and San Marcos Springs could be affected during critical drought conditions

Instream uses-The use of water for the protection of water quality, the maintenance of aquatic and wildlife habitat, navigation, recreation, and bays and estuaries.

Irrigation use-The use of water for the irrigation of commercial crops, including orchards, and for pastureland.

Irrigation water use efficiency-The percentage of that amount of irrigation water which is beneficially used by the crops in production relative to the amount of water diverted from the source of supply Beneficial uses of water for irrigation purposes include, but are not limited to, evapotranspiration needs for crop maintenance and growth and salinity management and leaching requirements associated with irrigation.

J-17 index well-State well Number AY-68-37-203 located in Bexar County and commonly referred to as the J-17 index well.

Livestock use-The use of water for the open-range watering of livestock connected with farming, ranching, or dairy enterprises.

Municipal use-The use of potable water within or without a municipality and its environs whether supplied by a person, privately-owned utility, political subdivision, or other entity as well as the use of municipal sewage effluent for certain purposes specified as follows. It includes the use of potable water for domestic purposes, fighting fires, sprinkling streets, flushing sewers and drains, watering parks and parkways, and recreational purposes including public and private swimming pools, the use of water in industrial and commercial enterprises supplied by a municipal distribution system without special construction to meet its demands, and for the watering of lawns and family gardens. Municipal use also includes the application of municipal sewage effluent upon land sites, pursuant to a Texas Water Code, Chapter 26, permit, where:

(A) the primary purpose of the application is the treatment and/or necessary disposal of such effluent; or

(B) the application site is a park, parkway, golf course, or other landscaped area owned by the owner of the permitted sewerage system, or

(C) the effluent applied to such site is generated within an area for which the commission has adopted a no-discharge rule.

New well-A producing well, the drilling of which, was completed after April 15, 1992.

Per capita use-The sum total of residential, commercial, and public and institutional uses diverted into a water supply system divided by actual population served based on verifiable data such as total housing units, active utility connections, hotel occupancy rates, and other relevant data.

Pollution-The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of any water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to public health, safety, or welfare, or impairs the usefulness of the public enjoyment of the waters for any lawful or reasonable purpose.

Producing well-A well capable of producing water from the Edwards Underground River without modification or the placement of additional equipment and which has lawfully produced water for a beneficial purpose prior to April 15, 1992.

Replacement well-A well that is drilled to replace or backup an existing well and where the existing well that is being replaced is plugged and closed within 30 days of commencement of diversion from the replacement well. A backup well is an auxiliary well to be used only in case of failure of the well for which it provides standby service.

Reuse-The authorized use for one or more beneficial purposes of use of water that remains unconsumed after the water is used for the original purpose of use and before that water is discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-owned water.

Waste-The diversion of water from the Edwards Underground River if the water diverted is not used for a beneficial purpose; the unreasonable loss of water through faulty design or negligent operation of a well or a water delivery or application system; the use of quantities of water in an amount in excess of the amount reasonably necessary to beneficially use the water for an authorized purpose; or the diversion of water from the Edwards Underground River at a rate, in an amount, or in any manner that causes or threatens to cause pollution of the Edwards Underground River by the intrusion of water or contaminants detrimental to any beneficial purpose, or adversely impacts surface water quality.

Well-A bored, drilled, or driven shaft, or an artificial opening in the ground made by digging, jetting, or some other method, where the depth of the well is greater than its largest surface dimension, but not including any surface pit, surface excavation, or natural depression.

This agency hereby certifies that the rule as adopted has been reviewed by legal counsel and found to be a valid exercise of the agency's legal authority.

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Mary Ruth Holder
Director, Legal Division
Texas Water Commission

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For further information, please call: (512) 463-8069

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Subchapter B. Permits and Other Authorizations

• 31 TAC §§298.11-298.20

The new sections are adopted under the Texas Water Code, §5.103 and §5.105, which provides the Texas Water Commission with the authority to adopt rules necessary to carry out its duties and responsibilities under the Texas Water Code and other state law.

§298.11. Permit Required.

(a) Except as provided by §298. 12 and §298.13 of this title (relating to Permit Exempt for Domestic and Livestock Use and Interim Authorizations Pending Disposition of Permit Applications), no person may divert any water from the Edwards Underground River, or begin construction of any well or other work designed for the diversion of water from the Edwards Underground River, without first obtaining a permit from the commission to make the diversion.

(b) Except as provided otherwise in subsection (c) of this section, the priority date of any permit issued by the commission pursuant to this section shall be the date the application is accepted for filing by the commission.

(c) Each application by an existing user and well owner received by the commission on or before November 10, 1992, shall be deemed to be accepted for filing on November 1, 1992, for purposes of time priority if, by that date, the application is postmarked or actually received by the commission on or before November 1, 1992, and the application, maps, and other submitted materials are in substantial compliance with the requirements of this chapter. For the purposes of this section, a declaration of historical use provided by §298. 14 of this title (relating to Declarations of Historical Use) shall constitute an application for a permit to divert and use water from the Edwards Underground River. Additionally, such application shall be deemed acceptable for filing without containing a water conservation plan and accompanied by necessary application fees if such plan and fees are subsequently submitted on or before June 1, 1993, in accordance with §298.15 of this title (relating to Water Conservation Plan) and other such necessary information requested by the executive director is submitted to the commission. Usage from a well shall be recognized for the well owner only, and not the end user if different from the well owner, so that such usage may not be authorized or permitted twice.

(d) An applicant not qualifying for interim authorization must submit an application, a water conservation plan, and all other applicable information provided by §298.14 of this title and in accordance with applicable provisions contained in Chapters 295 and 297 of this title (relating to Water Rights, Procedural and Water Rights, Substantive). The commission shall not accept for filing, review, nor take action on applications by persons not qualifying for interim authorization until final action is taken on those declarations of historical use and corresponding water conservation plans timely submitted in accordance with this chapter. This moratorium shall remain in effect until historical claims can be evaluated and a determination is made on the availability of unappropriated water for new uses.

§298.12. Permit Exemption for Domestic and Livestock Use.

(a) Without obtaining a permit under §298.11 of this title (relating to Permit Required), a person may construct on that person's own property a well for the diversion of water from the Edwards Underground River and beneficially use such water without waste for domestic and livestock purposes only.

(b) A person may use water for domestic and livestock purposes pursuant to this section only on property owned by that person and may not transport the water off that person's property.

(c) The exemption provided by this section does not apply where the flows of one well are combined with flows from any other well prior to the use of the water except as provided by subsection (b) of this section.

(d) A person owning a well and claiming an exemption for such well pursuant to this section must register the ownership, location, depth, size, diameter, and maximum pumpage capacity in gallons per minute of the well with the commission. Such registration must be submitted to the commission on or before September 1, 1993, or 30 days after completion of the well, whichever is later. Changes in any information contained in the registration must be filed with the commission not later than 30 days after such change.

§298.13. Interim Authorizations Pending Disposition of Permit Applications.

(a) Subject to the limitations provided by §298.42 and §298.51 of this title (relating to Limitation of Maximum Annual Diversions to Protect Water Quality, the Public Health, Safety, and Welfare, Aquatic and Wildlife Habitat, Instream Uses, Bays and Estuaries, and Other Public Purposes and Emergencies), a person owning a producing well which diverts water from the Edwards Underground River, other than a domestic and livestock well that is exempt under §298.12 of this title (relating to Permit Exemption for Domestic and Livestock Use), may continue to divert and beneficially use water without waste from the Edwards Underground River by using that well in accordance with the terms of this section if, but only if, the well was in compliance with all rules and statutes relating to well construction, approval, location, spacing, and any other applicable law on or before April 15, 1992, and the person submits to the commission:

(1) a declaration of historical, actual beneficial use pursuant to §298.14 of this title (relating to Declarations of Historical Use) for non-exempt wells owned by that person with the commission on or before November 1, 1992;

(2) a water conservation plan as provided by §298.15 of this title (relating to Water Conservation Plan) and all required application fees by June 1, 1993; and

(3) all other reasonable and necessary information requested by the executive director and that otherwise meets all applicable requirements contained in this chapter and other applicable law.

(b) Each person qualifying under subsection (a) of this section for interim authorization to divert and use water from the Edwards Underground River may continue to divert and beneficially use water without waste in accordance with this section. Such use may not exceed on an annual basis the historic, maximum, annual, actual beneficial use of water from the well without waste as evidenced by the person's declaration of historical use, unless such amount is determined otherwise by the commission pursuant to subsections (c)-(f) of this section.

(c) On its own motion, on the motion of the executive director, or on the motion of any affected person for good cause shown, the commission may determine the following.

(1) the extent to which, and the purposes of use for which, water was actually diverted from the Edwards Underground River by using the well and applied to beneficial use was without waste prior to the date these rules were adopted, and

(2) the extent to which, and the purposes of use for which, water is then being diverted from the Edwards Underground River by using the well and applied to beneficial use without waste.

(d) In making determinations pursuant to subsection (c) of this section, the commission shall utilize all available information including, but not limited to, the water conservation plans and declarations of historical use filed pursuant to §298.15 and §298.14, respectively, of this title.

(e) It shall be the burden of the declarant of historical use to demonstrate by substantial and convincing evidence that person's historical beneficial use without waste.

(f) All interim authorizations granted by this section, and all diversions made pursuant to these authorizations, are subject to limitation, curtailment, and amendment to prevent waste and protect water quality.

(g) The interim authorizations granted by this section shall terminate with respect to diversions from a well upon entry of a final and appealable order by the commission acting on the application or applications under §298.11 of this title (relating to Permit Required) for permits for those wells.

§298.14. Declarations of Historical Use.

(a) Each person owning a producing well diverting water from the Edwards Underground River and who desires to continue to use the well shall, on or before November 1, 1992, file with the commission a sworn declaration of historical actual use and copies of all supporting documentation for the well, other than a domestic and livestock well that is exempt under §298.12 of this title (relating to Permit Exemption for Domestic and Livestock Use), covering the period beginning January 1, 1982, and ending April 15, 1992.

(b) For the purposes of §298.11 of this title, a declaration of historical use shall constitute an application for a permit if a water conservation plan and all necessary application fees are subsequently and timely submitted in accordance with §298.15 of this title (relating to Water Conservation Plan)

(c) Failure to timely file a declaration of historical use or water conservation plan in accordance with this section and §298.15 of this title shall result in the immediate termination of the interim authorization granted by §298.13 of this of this title (relating to Interim Authorizations Pending Disposition of Permit Applications). A person whose interim authorization has been terminated pursuant to this subsection must submit an application for a new use pursuant to §298.11(d) of this title and have such application approved by the commission before the person is authorized to divert and use water from the Edwards Underground River in accordance with the terms and conditions of the permit and applicable commission rules and statutes.

(d) Each declaration of historical use shall include the following information and all supporting documentation, to the extent the information and documentation are available or capable of being produced, calculated, or estimated:

(1) the name and mailing address of each person holding an ownership interest in each well;

(2) the name and mailing address of any other person holding any other interest in each well or the real property on which each well is located;

(3) the location of the well and distance and direction from the nearest survey corner, the date of commencement of construction of the well, the size and depth of the well, and the date of first withdrawal and beneficial use of water from the well,

(4) the volume of water diverted by the Edwards Underground River during each calendar year beginning January 1, 1982, and ending April 15, 1992.

(5) the purpose or purposes of use to which the water was applied;

(6) the maximum volume of such water that was beneficially used for each purpose of use during a calendar year beginning January 1, 1982, and ending April 15, 1992;

(7) the place of use of the water;

(8) if the filing is for irrigation.

(A) the legal description of the larger tract in which irrigation occurs and a topographical or photographical map of the land irrigated with water produced from the Edwards Underground River and the year in which the land was first irrigated;

(B) the number of acres of land actually irrigated with water from the

Edwards Underground River in each calendar year beginning January 1, 1982, and ending April 15, 1992;

(C) the type of crops grown on the land and the cropping patterns used; and

(D) the irrigation methods and devices actually used in the irrigation of the land;

(9) evidence of the ownership and other interests in each well, and in the real property on which the well is located, of all persons listed in response to subsection (b)(1) and (2) of this section;

(10) one or more sworn statements reciting that all of the information contained in the declaration of historical use is based on the personal knowledge of the person or persons making the sworn statements or the best and most complete available records and is true and correct to the best of that person's knowledge or recollection and all supporting documentation; and

(11) other pertinent information the executive director may require.

(e) All declarations of historical use filed with the commission shall be available in the offices of the commission for public inspection during regular office hours.

§298.15. Water Conservation Plan.

(a) A water conservation plan shall be submitted with any permit application or for any other authorization to divert and use water from the Edwards Underground River, except that an applicant who has qualified for interim authorization and who has submitted a declaration of historical use not later than November 1, 1992, in accordance with §§298.11, 298.13, and 298.14 of this title (relating to Permit Required; Interim Authorizations Pending Disposition of Permit Applications; and Declarations of Historical Use) shall submit a water conservation plan in accordance with this section not later than June 1, 1993. Such plan shall provide for the implementation by the permittee of water conservation measures so that only that amount of water is used that is reasonable and necessary for the proposed use and is beneficially used without waste. All users of state water shall provide evidence that reasonable diligence shall be used to avoid waste and achieve water conservation, including the efficient management of such water and the achievement of water conservation goals as provided in a water conservation plan approved by the commission.

(b) A water conservation plan shall conform to applicable commission rules and guidelines provided by §295.9 of this title (relating to Water Rights, Procedural) and pursuant to the Texas Water Code, §11.1271.

(c) A water conservation plan shall contain a drought management plan providing drought use measures necessary to achieve the emergency curtailment of use as required by §298.51 of this title (relating to Emergencies).

(d) A water management plan shall be submitted by any person authorized to use 1,500 acre-feet of water per year or more not later than September 1, 1995. Such plan shall contain, but not be limited to, a study identifying feasible alternative sources of water supply, the reuse of water, and the steps and time schedule for the implementation of the water management plan.

§298.16. Commission Review and Action On Permit Application.

(a) No action shall be taken on any application prior to June 1, 1993, and until all required materials fees and information, including the applicant's water conservation plan, have been submitted to the commission in accordance with this chapter and other applicable commission rules and state law.

(b) For existing users who timely file a sworn declaration of historical use and establish by substantial and convincing evidence of beneficial use of the waters of the Edwards Underground River without waste, the commission shall grant a permit, to the extent that the water is available for appropriation, for an amount of water equivalent to the maximum actual beneficial use of water without waste during any one of the calendar years beginning January 1, 1982-April 15, 1992, inclusive. Provided, however, each existing user who has operated a well for three or more years during the period beginning January 1, 1982-April 15, 1992, shall receive, to the extent that water is available for appropriation, a permit for an annual use of the average amount of water withdrawn per year and beneficially used without waste during the period beginning January 1, 1982 and ending April 15, 1992, beginning with the first full calendar year in which the well was placed in operation.

(c) Permits granted pursuant to this section shall be subject to administration in the same manner as rights to use surface water acquired under the Texas Water Code, Chapter 11.

(d) Pursuant to the Texas Water Code, §§11.121 et seq, the commission may grant an application for a new well or expanded use from a producing well only if:

(1) the application conforms to the requirements prescribed by this chapter and applicable provisions contained in Chapters 295 and 297 of this title (relating to Water rights, Procedural and Water Rights, Substantive);

(2) water from the Edwards Underground River is available for appropriation;

(3) the application contemplates the application of water for a beneficial use,

(4) the proposed use does not impair existing water rights,

(5) the proposed use is not detrimental to the public welfare, and

(6) the applicant has provided evidence that reasonable diligence will be used to avoid waste and achieve water conservation.

(e) No new use from a new well or an amendment to an existing use from an existing well as provided by §298.19(b) of this title (relating to Amendments Required) will be authorized that does not employ the most efficient diversion, delivery, distribution, application, and utilization systems appropriate to the proposed use and using the best available technology.

(f) Any water conservation and reuse measures prescribed by the commission, reductions in use to meet overall goals provided by §298. 42 and §298.51 of this title (relating to Limitation of Maximum Annual Diversions to Protect Water Quality, the Public Health, Safety, and Welfare, Aquatic and Wildlife Habitat, Instream Uses, Bays and Estuaries, and Other Public Purposes), and any other requirements necessary to effectuate the purposes of this chapter shall be implemented as required by the terms and conditions of the commission order or water right, or by rule.

(g) Information relating to the implementation of the permittee's water conservation plan, drought management plan, the achievement of use reduction requirements to meet goals established by §298.42 and §298.51 of this title, and related permit conditions required under this section must be provided in the annual report provided by §295.202 of this title (relating to Reports) on the form prescribed by the executive director. Such information shall include a discussion of the implementation of water conservation and reuse measures and the progress made toward the obtainment of water conservation and use reduction goals.

(h) It shall be the burden of the applicant to demonstrate that the requested amount of appropriation is necessary and reasonable for the proposed use.

§298.17. Right Limited to Beneficial Use.

(a) Except as further limited by Subchapters E and F of this chapter (relating to Regulation of Diversions-General and Regulation of Diversions Emergency), the right to use state water under any permit or other authorization is limited to the amount which is being or can be beneficially used for the authorized purposes without waste but not to exceed the amount specifically appropriated

(b) Water which is wasted, lost, or inefficiently used because of, but not limited to, inefficient diversion works or distribution systems, excessive application, excessive or unnecessary evaporation, transpiration or seepage, faulty design, or by pollution is not beneficially used and is a violation of the water right.

(c) The right to appropriate that amount not beneficially used cannot be perfected and is subject to limitation, cancellation, and forfeiture as provided by law.

§298.18. Moratorium on New Authorisations.

(a) A person may not drill a new well or divert water from the Edwards Underground River by using a well, not a producing well, except as authorized by the commission.

(b) The commission shall not consider nor take action on any application relating to any proposed or existing well for which there is no evidence or historical record of actual beneficial use prior to April 15, 1992, until a final determination has been made on all applications (declarations of historical use) submitted on or before November 1, 1992, and timely supplemented by a water conservation plan, in accordance with §298.14 and §298.15 of this title (relating to Declorations of Historical Use and Water Conservation Plan).

(c) Any authorization other than interim authorization granted pursuant to §298.13 of this title (relating to Interim Authorations Pending Disposition of Permit Applications) for the diversion and beneficial use of water from the Edwards Underground River shall not be granted unless it is determined by the commission that such new use provides for the implementation of water conservation, reuse, distribution, and application measures using best available technology.

(d) Subsection (a) of this section shall not apply to a replacement or backup well if:

(1) the amount, rate, volume, purpose of use, and any other requirement applicable to the well replaced or backed up is met by the operation of the replacement well;

(2) the replacement well is drilled on the same tract of land and in the same hydrologic unit of the Edwards Underground River as the well replaced;

(3) the replacement well will not adversely affect any existing well or water rights; and

(4) the replacement well is approved pursuant to subsections (e) and (f) of this section.

(e) A person proposing to drill a replacement well shall submit the following information to the executive director prior to drilling the replacement well.

(1) the ownership and the locations by latitudinal and longitudinal coordinates and the distance and direction from the nearest survey corner for the replacement well and the well to be replaced;

(2) the hydrogeologic unit to which the well to be replaced was drilled and to which the replacement well is to be drilled;

(3) the depth of both wells;

(4) the size and capacity of both wells;

(5) an evaluation of the impact of the replacement well will have on any existing well or water rights owned by another person; and

(6) a map showing the location of both wells in relationship to property ownership boundaries and any existing wells within one mile of the replacement well.

(f) The executive director shall review the information submitted pursuant to subsection (e) of this section and, if in his judgment the proposed replacement well will not adversely affect an existing well or water rights owned by another person, he may approve the replacement well. If the executive director does not approve the replacement well, the person proposing to drill the replacement well shall comply with subsection (a) of this section. A determination by the executive director pursuant to this subsection may be appealed to the commission by an applicant or an affected person.

§298.19. Amendments Required.

(a) Each holder of a permit issued under §298.11 of this title (relating to Permit Required), and each person granted interim authorization under §298.13 of this title (relating to Interim Authorizations Pending Disposition of Permit Applications), must obtain prior authorization from the commission to change the purpose of use (which includes using water for any additional purpose of use or any secondary use), to change the location of any well, rate of withdrawal, place of use or acreage to be irrigated, or to alter the permit or interim authorization in any other manner.

(b) An application to amend an existing water right for any of the following reasons must include a water conservation plan as provided by applicable provisions of §298 15 of this title (relating to Water Conservation Plan)

(1) to increase the amount of the appropriation,

(2) to change the purpose of use of the appropriation, or

(3) to change the place of use unless the request is to expand the amount of acreage to be irrigated adjacent to the existing, authorized irrigated tract without an increase in the appropriation

(c) An agreement providing for the contractual sale of water from the Edwards Underground River for a period of less than three years shall be filed with the executive director for approval not later than 30 days prior to the effective date of the sale agreement.

§298.20. Approval for Alterations

(a) A person may not make any alteration, enlargement, or other change to any well from which water is diverted from the Edwards Underground River without first obtaining the approval of the commission, except for ordinary maintenance or emergency repair of the well and except as provided by subsections (b) and (c) of this section.

(b) Without obtaining commission approval, a person may modify a well if the modification does not alter the location or rate of production of the well.

(c) Without obtaining commission approval, a person may modify a well that is exempt under §298.12 of this title (relating to Permit Exemption for Domestic and Livestock Use) if the well continues to qualify for exemption after that modification.

This agency hereby certifies that the rule as adopted has been reviewed by legal counsel and found to be a valid exercise of the agency's legal authority.

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Mary Ruth Holder
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Texas Water Commission

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Subchapter C. Conveyances

• 31 TAC §§298.21-298.23

The new sections are adopted under the Texas Water Code, §5.103 and §5.105, which provides the Texas Water Commission

with the authority to adopt rules necessary to carry out its duties and responsibilities under the Texas Water Code and other state law.

§298.21. Transfer of Ownership and Change of Address. In addition to meeting applicable requirements contained in commission rules relating to the transfer and sale of water rights, each person required to file a declaration of historical use under §298.14 of this title (relating to Declarations of Historical Use), and each person to whom a permit is issued pursuant to §298.11 of this title (relating to Permit Required), shall notify the commission of a change in name or mailing address or any transfer of the ownership of the well or permit. Any person to whom the well or permit is transferred shall notify the commission of the transfer and shall furnish any additional information as required by the executive director. Such notifications shall be within 30 days of the conveyance.

§298.22. Contractual Sales. Commission approval for a contractual sale of water is subject to the imposition of the conservation and reuse requirements contained in the seller's permit or to which the buyer is subject as directed or modified by the executive director.

§298.23. Application by City or Town to Acquire Appropriation Without Compensation (Wagstaff Act).

(a) The Wagstaff Act, Texas Water Code, §11.028, provides that any appropriation made after May 17, 1931, for any purpose other than domestic or municipal use is subject to the right of any city or town to make further appropriations of the water for domestic or municipal use without paying for the water.

(b) Except as authorized by the commission, no city or town may make further appropriation pursuant to the Wagstaff Act.

(c) In determining whether to approve such further appropriation pursuant to subsection (b) of this section, the commission shall consider the social and economic hardship of the proposed appropriation on the affected person and community and shall seek to minimize the impact upon irrigation or other uses which may be subject to the Act.

(d) An application for commission approval pursuant to subsection (b) of this section must be submitted to the commission for review and approval and notice and opportunity for hearing given to the affected water right holders prior to commission action on any such further appropriation.

(e) An application must contain all applicable information necessary for a transfer of a water right and must be accompanied by a water conservation plan as provided by §298.15 of this title (relating to Water Conservation Plan).

(f) The commission shall not approve an application for further appropriation if the commission finds:

(1) the application does not meet commission requirements as provided by subsection (e) of this section;

(2) proper notice and opportunity for hearing was not provided to all affected persons;

(3) the proposed transfer would adversely affect senior water rights not subject to appropriation pursuant to subsection (a) of this section;

(4) the applicant fails to demonstrate a need for the amount of the appropriation;

(5) the applicant has not eliminated all nonessential and discretionary use, including, but not limited to, recreational or aesthetic use, pools, spas, fountains, landscaping, residential lawns, or ornamental trees and shrubbery, artificial or augmented waterways, water gardens and parks, watering, automobile and machinery washing, or municipal uses not essential for the protection of the public health, safety, and welfare;

(6) there is a feasible alternative to the proposed appropriation; or

(7) the proposed appropriation would adversely impact water quality or the environment or be detrimental to the public health, safety, or welfare.

(g) Information provided by the applicant in the water conservation plan shall be considered by the commission in determining whether any feasible alternative to the requested appropriation exists and whether the requested amount of appropriation as measured at the point of diversion is reasonable and necessary for the proposed use. Based upon its review, the commission shall determine whether to deny or grant, in whole or in part, the requested appropriation.

(h) It shall be the burden of the applicant to demonstrate that no feasible alternative to the proposed appropriation exists, that the requested amount of appropriation is necessary and reasonable for the proposed use, and is otherwise justified pursuant to this section.

(i) Any water conservation measures prescribed by the commission shall be implemented as required by the terms and conditions of the commission order or water right, or by rule.

This agency hereby certifies that the rule as adopted has been reviewed by legal counsel and found to be a valid exercise of the agency's legal authority.

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Subchapter D. Water Use Measurement and Reporting

• 31 TAC §298.31, §298.32

The new sections are adopted under the Texas Water Code, §5.103 and §5.105, which provides the Texas Water Commission with the authority to adopt rules necessary to carry out its duties and responsibilities under the Texas Water Code and other state law.

§298.31. Water Use Measurement.

(a) Except as provided by subsection (b) of this section, the owner of each well which diverts water from the Edwards Underground River, other than a well that is exempt under §298.12 of this title (relating to Permit Exemption for Domestic and Livestock Use), shall, prior to diversion from the well, install and maintain a measuring device designed to indicate the flow rate and the cumulative amount of water diverted by that well. The measuring device shall indicate flow rate and amount, with instantaneous readout in cubic feet per second or gallons per minute, and have a flow totalizer with a readout in acre-feet or gallons, and must be accurate within 5.0%.

(b) The measuring device for each existing well capable of operation the commission shall be installed before September 1, 1993. For any other well, the measuring device shall be installed before any water is withdrawn from that well.

(c) The requirement to install and maintain a measuring device in any well may be waived by the executive director, upon written request by the well owner to utilize an alternative method of determining the flow rate and the amount of water diverted by the well. The proposed alternative method must result in determinations of flow rate and amounts of water diverted within an accuracy of 5.0%.

§298.32. Reports.

(a) Not later than March 1 of each year, beginning in 1994, each person required to file a declaration of historical use under §298.14 of this title (relating to Declarations of Historical Use), and each person to whom a permit is issued pursuant to §298.11 of this title (relating to Permit Required), shall file with the commission a written report of water use for the preceding calendar year on a form prescribed by the executive director, providing the information required by the executive director.

(b) The commission by order, rule, or permit condition may require of any person such other record keeping, reporting of water use, and notification of water demands, as may be determined by the commission to be necessary or desirable to accomplish the purposes of this chapter.

This agency hereby certifies that the rule as adopted has been reviewed by legal counsel and found to be a valid exercise of the agency's legal authority.

Issued in Austin, Texas, on September 9, 1992.

TRD-9212651
Mary Ruth Holder
Director, Legal Division
Texas Water Commission

Effective date: October 7, 1992

Proposal publication date: April 24, 1992

For further information, please call: (512) 463-8069

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Subchapter E. Regulation of Diversions–General

• 31 TAC §298.41, §298.42

The new sections are adopted under the Texas Water Code, §5.103 and §5.105, which provides the Texas Water Commission with the authority to adopt rules necessary to carry out its duties and responsibilities under the Texas Water Code and other state law.

§298.41. Waste Prohibited

(a) The waste of water is prohibited.

(b) No person may divert, supply, use, or reuse any water from the Edwards Aquifer, or supply, use, or reuse any water from other sources that reduces the demand for water from the Edwards Underground River, in excess of the amount of water needed for beneficial use for the intended purpose or purposes of use.

§298.42. Limitation of Maximum Annual Diversions to Protect Water Quality, the Public Health, Safety, and Welfare, Aquatic and Wildlife Habitat, Instream Uses, Bays and Estuaries, and Other Public Purposes.

(a) Total authorizations to directly divert and use water from the Edwards Underground River, and all authorizations and rights to make such diversions, shall be limited in accordance with this section in order to: protect the water quality of the Edwards Underground River; protect the water quality of the surface streams to which the Edwards Underground River provides significant springflow, achieve water conservation, maximize the beneficial use of water available for diversion from the underground river, protect aquatic and wildlife habitat, and provide for instream uses and bays and estuaries.

(b) Except as provided by subsection (d) of this section and §298.51 of this title (relating to Emergencies), for the period ending December 31, 2007, the total authorized amount of direct diversions from the Edwards Underground River shall not exceed 450,000 acre-feet of water per calendar year.

(c) Except as provided by subsection (d) of this section and §298.51 of this title, for the period beginning January 1, 2008, the total authorized amount of direct diversions from the Edwards Underground River shall not exceed 400,000 acre-feet of water per calendar year. If through studies of such strategies as springflow augmentation, diversions downstream of the springs, supplemental recharge, conjunctive management of surface and subsurface water, and other strategies to optimize the use of the Edwards Underground River, it is determined that additional supplies are available, the commission will consider modification of the limitations established by these rules.

(d) When the level of the Edwards Underground River is equal to or greater then 665 feet above mean sea level as measured at the J-17 index well, the commission may authorize the direct diversion, on an interruptible basis, of additional amounts above the limitations contained in subsections (b) and (c) of this section. Such additional diversions shall be limited to ensure that springflows are not affected during critical drought conditions.

This agency hereby certifies that the rule as adopted has been reviewed by legal counsel and found to be a valid exercise of the agency's legal authority.

Issued in Austin, Texas, on September 9, 1992.

TRD-9212652
Mary Ruth Holder
Director, Legal Division
Texas Water Commission

Effective date: October 7, 1992

Proposal publication date: April 24, 1992

For further information, please call: (512) 463-8069

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Subchapter F. Regulation of Diversions-Emergency

• 31 TAC §298.51

The new section is adopted under the Texas Water Code, §5.103 and §5. 105, which provides the Texas Water Commission with the authority to adopt rules necessary to carry out its duties and responsibilities under the Texas Water Code and other state law.

§298.51. Emergencies

(a) The total authorized amount of water which may be directly diverted from the Edwards Underground River may not exceed 350,000 acre-feet per year if the Edwards Underground River drops to a level of 625 feet above mean sea level as measured at the J-17 index well. Substantial demand reduction measures shall be in place prior to when the water level in the J-17 index well reaches 625 feet above mean sea level so that authorized withdrawals do not exceed authorized amounts during this period. Such reduction shall be achieved by the curtailment of uses nonessential for the protection of the public health, safety, and welfare, through the implementation of permittees' drought management plans contained in their water conservation plans approved by the commission and/or the purchase or lease of others' water rights to divert water from the Edwards Underground River. Initial stages of the drought management plans shall be implemented not later than when the water level falls to 649 feet above mean sea level as measured at the J-17 index well.

(b) The executive director shall notify the Texas Parks and Wildlife Department and the United States Fish and Wildlife Service immediately when the level of the Edwards Underground River Falls to 640 feet above mean sea level as measured at the J-17 index well and shall consult with these agencies in determining any recommendations to the commission concerning action to take in response to the potential emergency.

This agency hereby certifies that the rule as adopted has been reviewed by legal counsel and found to be a valid exercise of the agency's legal authority.

Issued in Austin, Texas, on September 9, 1992.

TRD-9212653
Mary Ruth Holder
Director, Legal Division
Texas Water Commission

Effective date: October 7, 1992

Proposal publication date: April 24, 1992

For further information, please call: (512) 463-8069

Subchapter G. Local Government

• 31 TAC §298.61

The new section is adopted under the Texas Water Code, §5.103 and §5. 105, which provides the Texas Water Commission with the authority to adopt rules necessary to carry out its duties and responsibilities under the Texas Water Code and other state law.

§§298.61. Delegation of Responsibilities

(a) Upon request by a water district, authority, or other political subdivision of the state having all necessary power, authority, and jurisdiction necessary to implement the regional water management plan as provided in this chapter, the commission may delegate to that political subdivision any of the commission's responsibilities under this chapter within the geographical boundaries of that political subdivision, except to the extent that the delegation is prohibited by law.

(b) The commission will give appropriate consideration to the recommendations of local governmental entities concerning matters at issue under this chapter within the geographical boundaries of the local governmental entity, such as relative amounts of withdrawals to be authorized among permit applicants within those boundaries, and additional requirements to be imposed to further reduce withdrawals and use of available water within those boundaries.

(c) The commission may establish a separate water division for the Edwards Underground River pursuant to the Texas Water Code, §11.325, and may delegate the duties and responsibilities of watermaster for such division to an appropriate local or regional entity, unless prohibited by law.

This agency hereby certifies that the rule as adopted has been reviewed by legal counsel and found to be a valid exercise of the agency's legal authority.

Issued in Austin, Texas, on September 9, 1992.

TRD-9212654
Mary Ruth Holder
Director, Legal Division
Texas Water Commission

Effective date: October 7, 1992

Proposal publication date: April 24, 1992

For further information, please call: (512) 463-8069

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Chapter 322. Community Wastewater Planning

• 31 TAC §§322.1-322.6

The Texas Water Commission (TWC) adopts new §§322.1-322.6, concerning community development of wastewater regional plans and TWC implementation of such plans through the permitting process, with changes to the proposed text as published in the April 17, 1992, issue of the *Texas Register* (17 TexReg 2726).

The TWC was appointed by the governor to be the lead agency for water quality planning. Additionally, TWC is the state agency designated in the Texas Water Code, §26.012 and §26.036, to develop comprehensive water quality management (WQM) plans for the different areas of the state. Section 26.036(b) allows TWC to contract with local governments, planning agencies, and other entities to prepare WQM plans. Further §26.036(d) requires any person developing such a plan to consult with TWC and other affected/interested governmental agencies.

Section 26.036(e) states that WQM plans shall be reasonably compatible with other governmental plans for the area. Section 26.177 requires municipal water pollution control and abatement programs in cities of 5000 or greater population to be submitted to TWC for review and approval. Regional plans should therefore be compatible with pollution abatement and other programs. In fact, they can become an integral part of municipal pollution abatement program plans for wastewater treatment.

Many communities are developing long term plans for wastewater treatment services in order to provide adequate facilities for citizens within the corporate limits and within municipal extraterritorial jurisdictions which usually include growth corridors. This proposed rule is intended to be a tool to encourage community regional planning. A community may design a regional plan with appropriate input from citizens, businesses and designated planning agencies. The plan should be approved by one of a designated planning agencies and/or TWC, as appropriate, and then implemented under ordinances adopted by the municipality. If the community desires TWC to review domestic wastewater permit applications in accordance with the adopted community regional plan, the community may make such a request.

The TWC will consider approved community regional plans when reviewing any type of domestic wastewater permit application. The TWC will assess the need for a permit in terms of quantity, quality, and length of permit term. If regional facilities become available before the renewal of a permit and the service area of the applicant is within a reasonable distance of the regional facility, TWC may decide not to renew the permit and require the serviced area to connect to the regional plant. The TWC may encourage areas not covered under an approved regional plan to investigate connecting to a regional plant or to become a regional facility itself.

The TWC received one comment related to this proposed rule from the Texas Water Development Board (TWDB). The TWDB is concerned that a plant funded by a TWDB loan may lose a source of revenue to repay that loan if the commission denies the renewal of the wastewater permit. Loss of investments and repayment of loans should be addressed in the regional plan and developers should be aware of this potential prior to seeking a permit from TWC. The TWC has added a paragraph to §322.6(b) to indicate that TWC will consider whether approval or denial of an application will affect an applicant's ability to meet its financial obligations to the State of Texas to repay loans issued by the Texas Water Development Board.

The new sections are adopted under the authority of the Texas Water Code, §§5.103, 5.105, and 5.120, which provides the commission with the authority to adopt rules as necessary to carry out its powers and duties under the Texas Water Code and other laws of the state and to establish and approve all general policies of the commission.

§322.1. Definitions. The following words and terms, when used in these sections, shall have the following meanings, unless the context clearly indicates otherwise.

Extraterritorial jurisdiction (ETJ)–That unincorporated area, not a part of any city, which is contiguous to the corporate limits as described in Texas Civil Statutes, Article 970A, §3, Subsection A.

Regional plan–A plan designed to provide wastewater treatment facilities for a specified area utilizing a minimum number of treatment plants.

§322.2. Scope and Applicability. The commission will consider regional plans approved by the commission and adopted by a municipality for the area within the city limits and its ETJ when evaluating a domestic wastewater permit application.

§322.3. Municipality Request for Implementation of a Regional Plan. Any city that adopts a regional plan and desires the commission to assist in implementing such plan shall submit a written request and a copy of the implementing ordinance to the Watershed Management Division of the commission.

§322.4. Application Requirements. Upon application for a permit to discharge treated domestic wastewater, the commission will require submission of information relating to alternatives to discharge (e.g. connection to an existing or planned system) and including documentation of communications with regional authorities and/or nearby permitted facilities. If the application is for a facility located in an area with an approved regional plan, the applicant must provide a copy of communications with the regional authority concerning the proposed facility's compliance with the regional plan.

§322.5. Notification. The commission shall notify municipalities with approved regional plans of any applications for a permit to discharge treated domestic wastewater within the city limits and/or ETJ.

§322.6. Commission Consideration of Regional Plans. The commission will take into consideration an approved regional plan when determining:

(1) whether to grant or deny an application for a new permit, an amendment application to an existing permit, or a renewal application;

CAUSE NO. 92-05214

DANNY MCFADIN and TEXAS FARM	§	**IN THE DISTRICT COURT**
BUREAU,	§	
Plaintiffs	§	
	§	
and	§	
	§	
MEDINA COUNTY UNDERGROUND	§	
WATER CONSERVATION DISTRICT;	§	
TEXAS AND SOUTHWESTERN CATTLE	§	
RAISERS ASSOCIATION; and	§	**TRAVIS COUNTY, TEXAS**
TEXAS SHEEP AND GOAT RAISERS	§	
ASSOCIATION	§	
Plaintiff-Intervenors	§	
	§	
V.	§	
	§	
	§	
THE TEXAS WATER COMMISSION,	§	
JOHN HALL, PAM REED, and	§	
PEGGY GARNER,	§	
Defendants	§	
	§	
and	§	
	§	
GUADALUPE-BLANCO RIVER	§	
AUTHORITY, and CITY OF	§	
SAN MARCOS	§	
Defendant-Intervenors	§	**331 JUDICIAL DISTRICT**

MODIFIED FINAL SUMMARY JUDGMENT

CAME ON TO BE HEARD on the 11th day of September, 1992, Plaintiffs, Danny McFadin and the Texas Farm Bureau, and Plaintiff-Intervenor Medina County Underground Water Conservation District's Motion for Summary Judgment, which motion was adopted by Plaintiff-Intervenors Texas and Southwestern Cattle Raisers Association and Texas Sheep and Goat Raisers Association. Having considered the Motion for Summary Judgment and Responses thereto, including the affidavits, briefs and exhibits filed therewith, the arguments of counsel, the pleadings and other summary judgment evidence properly

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DISTRICT CLERK
TRAVIS COUNTY, TEXAS

on file with the Court at the time of the hearing, the Court finds that there is no genuine issue of material fact and that Plaintiffs are entitled to Judgment as a matter of law. Further, having considered Defendant-Intervenors' Motion for Reconsideration, the Court's Final Judgment of October 2, 1992, is modified as set forth below. The Court, therefore, enters its declaratory judgment that both emergency rules (31 TAC 298), adopted by the Texas Water Commission on April 15, 1992, and permanent rules (31 TAC 298) adopted on September 9, 1992, are void and of no force and effect.

IT IS **THEREFORE, ORDERED, ADJUDGED AND DECREED** that pursuant to Texas Rule of Civil Procedure 166a, Plaintiffs, Danny McFadin and the Texas Farm Bureau, and Plaintiff-Intervenor Medina County Underground Water Conservation District's Motion for Summary Judgment is hereby in all things **GRANTED**, and Texas Water Commission Rules (31 TAC 298), declaring the Edwards Aquifer an underground river and state water, are hereby adjudged invalid.

IT IS **FURTHER ORDERED, ADJUDGED AND DECREED** that the Edwards Aquifer is subject to regulation as an underground reservoir under Chapter 52 of the Texas Water Code. Under existing statutes, the Texas Water Commission is without authority to enact the emergency rules adopted April 15, 1992, or the permanent rules adopted on September 9, 1992.

Costs are hereby assessed against the Defendants. All relief requested and not expressly granted is hereby **DENIED**.

SIGNED this the 21st day of December, 1992.

/s/ Pete Lowry
HONORABLE PETE LOWRY
JUDGE PRESIDING

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
MIDLAND-ODESSA DIVISION

FILED
FEB 01 1993
CHARLES W. VAGNER, Clerk
By Deputy

SIERRA CLUB, §
§
Plaintiff, §
§
GUADALUPE-BLANCO RIVER §
AUTHORITY, ET AL. §
§
Plaintiff-Intervenors, §
§
v. § MO-91-CA-069
§
MANUEL LUJAN, JR., In His §
Official Capacity As Secretary, §
Department of Interior, and §
THE UNITED STATES FISH AND §
WILDLIFE SERVICE, §
§
Defendants, §
§
§
DANNY McFADIN, TOMMY §
WALKER, CARL MUECKE, ET AL. §
§
Defendant-Intervenors. §

JUDGMENT

THIS COURT, by separate Findings of Fact and Conclusions of Law, ruled in favor of Plaintiff and Plaintiff-Intervenors in the above-captioned cause. This Court's rulings properly dispose of Plaintiff's, Plaintiff-Intervenor's, Defendants', Defendant-Intervenors, and *Amici Curiae* issues in their entirety. Accordingly, the following Judgment, pursuant to Rule 58 of the Federal Rules of Civil Procedure, is appropriate. Accordingly,

IT IS THEREFORE ORDERED that, in connection with Plaintiffs' allegations of violations by the Federal Defendants of §§ 4 and 9 of the Endangered Species Act (the "ESA"), the following minimum springflow findings shall serve as *interim* springflow findings for all purposes under the ESA, until the United States Fish and Wildlife Service (the "USFWS") modifies those findings as set forth below:

(1) Fountain Darters are "taken" (within the meaning of 16 U.S.C. § 1538(a)(1)(B)), as a result of withdrawals from the Edwards Aquifer, whenever the Comal springflow drops to some (as-yet) undefined springflow or range of springflows greater than 100 cfs.

(2) The "continued existence" of the Fountain Darter as a species is "jeopardized" (within the meaning of 16 U.S.C. § 1536(a)(2)), as a result of withdrawals from the Edwards Aquifer, whenever the Comal springflow drops to some (as-yet) undefined springflow or range of springflows greater than 0 cfs. Allowing the springs to cease flowing for *any* period of time, even during drought conditions, would pose an unacceptable risk to the continued existence of the Fountain Darter.

(3) "Critical habitat of Texas Wild-rice" is "destroyed or adversely modified" (within the meaning of 16 U.S.C. § 1536(a)(2)), as a result of withdrawals from the Edwards Aquifer, whenever the San Marcos springflow drops to some (as-yet) undefined springflow or range of springflows greater than 100 cfs.

IT IS **FURTHER ORDERED** that the USFWS may at any time modify the *interim* minimum springflow findings, based on available information and in the exercise of its best professional judgment.

IT IS **FURTHER ORDERED** that the USFWS shall determine within forty-five (45) days of the filing of this Judgment based on available information and in the exercise of its best professional judgment, the following:

(1) the springflow at Comal Springs at which Fountain Darters begin to be "taken" as springflow drops;

(2) the minimum springflow required at Comal Springs to avoid "jeopardy" to the Fountain Darter;

(3) the minimum springflow required at San Marcos Springs to avoid destruction or adverse modification of defined critical habitat for any listed species;

(4) the springflow at San Marcos Springs at which Texas Wild-rice begins to be damaged or destroyed as the springflow drops;

(5) the springflow at San Marcos Springs at which any listed wildlife species begins to be "taken" as the springflow drops;

(6) the minimum springflow required at San Marcos Springs to avoid "jeopardy" to any listed species;

(7) the minimum springflows or minimum water levels in the Edwards at which Texas Blind Salamanders begin to be "taken" as springflows and water levels drop; and

(8) the minimum springflows or minimum water levels in the Edwards required to avoid "jeopardy" to the Texas Blind Salamander.

IT IS FURTHER ORDERED that the USFWS may at any time and from time to time modify any of its minimum springflow or Edwards Aquifer level determinations, based on available information and in the exercise of its best professional judgment.

IT IS FURTHER ORDERED that the USFWS shall notify this Court and all parties of each minimum springflow and Edwards Aquifer level determination, of each USFWS modification to any such determination, and of each USFWS modification to any of this Court's *interim* minimum springflow findings, promptly upon USFWS making the determination or modification.

IT IS FURTHER ORDERED that the USFWS shall file monthly reports on the status of its ongoing efforts to define, and then refine, the Comal and San Marcos minimum springflows, and the Edwards Aquifer minimum levels, required for the conservation and survival of listed species.

IT IS FURTHER ORDERED that the USFWS shall promptly provide all Federal agencies to which Plaintiff or Plaintiff-Intervenors gave notices of violations (the "Federal Agencies") with a copy of this Judgment, and the USFWS shall further advise all Federal Agencies of each minimum springflow and Edwards Aquifer level determination made by the USFWS, and of any modification made by the USFWS to any such determination or to any interim minimum springflow finding made by this Court, promptly upon the USFWS making that determination or modification, so that those agencies will be able to perform their duties under the ESA *if the State of Texas fails or refuses to regulate withdrawals from the Edwards Aquifer* to whatever extent may be required to avoid jeopardy to, and destruction or adverse modification of critical habitat of, any listed species.

IT IS FURTHER ORDERED that the USFWS shall promptly provide all persons and entities known or believed by the USFWS to be withdrawing water from the Edwards Aquifer ("Pumpers") with a copy of this Judgment, and the USFWS shall further advise all Pumpers of each minimum springflow and Edwards Aquifer level determination made by the USFWS, and of any modification made by the USFWS to any such determination or to any minimum springflow finding made by this Court, promptly upon the USFWS making that determination or modification, so that those Pumpers will be able to take appropriate action if the State of Texas fails or refuses to regulate withdrawals to the extent necessary to avoid unlawful takings of listed wildlife species or unlawful damage or destruction of Texas Wild-rice.

IT IS **THEREFORE ORDERED** that Defendant-Intervenor the Texas Water Commission shall prepare a plan that, in its best professional judgment, assures that the Comal Springs and San Marcos Springs will not drop below jeopardy levels as defined by the USFWS, even in a repeat of the drought of record, and it shall submit that plan to the Court and all parties by not later than March 1, 1993.

IT IS **FURTHER ORDERED** that Plaintiff and Plaintiff-Intervenors may seek appropriate relief from this Court at any time *after* May 31, 1993 (the last day of the current regular session of the Texas legislature) *if the State of Texas does not have in effect at such time*, pursuant to new or existing State law, a regulatory system pursuant to which withdrawals from the Edwards Aquifer can and will be limited to whatever extent may be required to avoid unlawful takings of listed species, jeopardy to any listed species, and destruction or adverse modification of critical habitat of any listed species, even in a repeat of the drought of record.

IT IS **FURTHER ORDERED** that upon Motion by Plaintiff and Plaintiff-Intervenors and Order by this Court, the parties are put on notice that this matter is tentatively scheduled for further hearing on Monday, June 28, 1993, to address the following issues:

(1) the status of review by the Texas courts of the TWC's efforts to regulate withdrawals from the Edwards Aquifer based on the TWC's determination that the water is owned by the state in trust for the benefit of the public;

(2) new State laws, if any, relative to the Edwards Aquifer;

(3) the status of applications for new listings of other species that rely upon springflows from the Comal or San Marcos Springs, or that live underground in the Edwards Aquifer;

(4) the status of USFWS' efforts to define, and then refine, the Comal and San Marcos minimum springflows, and the Edwards Aquifer minimum levels, required for the conservation and survival of listed species; and

(5) any additional relief sought by Plaintiff and Plaintiff-Intervenors under Federal law because of inadequacy of state law or because of inadequacy of the State's implementation under that law.

IT IS FURTHER ORDERED that judgment be entered against the Federal Defendants and in favor of Plaintiff and Plaintiff Intervenors for the cost of litigation, including reasonable attorney and expert witness fees pursuant to 16 U.S.C. § 1540(g)(4) and the Equal Access to Justice Acts, 28 U.S.C. § 2412. Plaintiff and Plaintiff-Intervenors and the Federal Defendants shall agree within thirty (30) days on the cost of litigation, and failing such agreement, shall file briefs stating the dispute of such costs.

IT IS FURTHER ORDERED Costs of Court are assessed against Federal Defendants. *See* 28 U.S.C. § 1920.

IT IS FINALLY ORDERED Motions pursuant to Rules 52, 59, and 60 of the Federal Rules of Civil Procedure shall be filed within ten (10) days after the filing of this Judgment.

SIGNED this 30th day of January, 1993.

Lucius D. Bunton

HONORABLE LUCIUS D. BUNTON, III
SENIOR DISTRICT JUDGE

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
MIDLAND-ODESSA DIVISION

FILED
FEB 01 1993
CHARLES W. VAGNER, Clerk
By Deputy

SIERRA CLUB, §
§
Plaintiff, §
§
GUADALUPE-BLANCO RIVER §
AUTHORITY, ET AL. §
§
Plaintiff-Intervenors, §
§
V. § MO-91-CA-069
§
MANUEL LUJAN, JR., In His §
Official Capacity As Secretary, §
Department of Interior, and §
THE UNITED STATES FISH AND §
WILDLIFE SERVICE, §
§
Defendants, §
§
§
DANNY McFADIN, TOMMY §
WALKER, CARL MUECKE, ET AL. §
§
Defendant-Intervenors. §

FINDINGS OF FACT AND CONCLUSIONS OF LAW

BEFORE THIS COURT came the above-captioned cause for bench trial in Midland, Texas on November 17-19, 1992. The case at bar involves three groups of parties. Group I, aligned as Plaintiffs: Plaintiff SIERRA CLUB; Plaintiff-Intervenors: (1) GUADALUPE-BLANCO RIVER AUTHORITY ("GBRA"); (2) CITY OF SAN MARCOS (3) CITY OF NEW BRAUNFELS and NEW BRAUNFELS UTILITIES; (4) BEXAR METROPOLITAN WATER DISTRICT ("BMWD"); (5) GREEN VALLEY WATER SUPPLY CORPORATION ("GVWSC") and ATASCOSA RURAL WATER SUPPLY CORPORATION ("ARWSC").

Group II, aligned as Defendants: Defendants MANUEL LUJAN, JR., and THE UNITED STATES FISH AND WILDLIFE SERVICE ("USFWS"); Defendant-Intervenors: (1) STATE OF TEXAS [TEXAS WATER COMMISSION ("TWC"), TEXAS PARKS AND WILDLIFE DIVISION (the "TPWD"), TEXAS DEPARTMENT OF AGRICULTURE (the "TDA")]; (2) CITY OF SAN ANTONIO, TEXAS; (3) UNITED SERVICES AUTOMOBILE ASSOCIATION ("USAA"), REDLAND STONE PRODUCTS COMPANY ("REDLAND"), SOUTHWEST RESEARCH INSTITUTE ("SOUTHWEST RESEARCH"), USAA REAL ESTATE COMPANY ("USAA REALCO"), and SOUTHWEST FOUNDATION FOR BIOMEDICAL RESEARCH ("SOUTHWEST FOUNDATION") (collectively, "INDUSTRIAL WATER USERS" or "IWU"); (4) GREATER SAN ANTONIO BUILDERS ASSOCIATION ("BUILDERS ASSOCIATION"); (5) DANNY McFADIN, TOMMY WALKER, and CARL MUECKE; (6) LIVING WATERS ARTESIAN SPRINGS, LTD. ("THE CATFISH FARM").

Group III, Aligned as *AMICI CURIAE*: (1) EDWARDS UNDERGROUND WATER DISTRICT ("EUWD"); (2) UNION CARBIDE CHEMICALS and PLASTICS COMPANY, INC., OCCIDENTAL CHEMICAL CORP., E.I. DuPONT De NEMOURS & COMPANY, INC., CENTRAL POWER & LIGHT, CO., THE CARBON/GRAPHITE GROUP, INC., and BP CHEMICALS (collectively, "INDUSTRIAL WATER USERS ON THE LOWER GUADALUPE RIVER ASSOCIATION" ("IWUA")); (3) THELMA AREA NEIGHBORHOOD CORPORATION ("TANC"). Parties and their counsel appeared and announced ready for trial. All jurisdictional prerequisites necessary for the maintenance of the claims of the parties are fulfilled. *See* 28 U.S.C. §§ 1331, 1343; *see also* 28 U.S.C. § 1402(b). After considering all the pleadings, the summary judgment evidence, the evidence presented at trial, and the testimony of live witnesses, the deposition transcripts and summaries, the copious proffered exhibits, the arguments of counsel, creative and otherwise, the controlling legal authorities, post-trial briefs, and proposed findings of fact and conclusions of law, this Court hereby enters its Findings of Fact and Conclusions of Law in accordance with Rule 52 of the Federal Rules of Civil Procedure.

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Endangered Species Act Introduction

1. Notwithstanding the existence of simple innuendos to possible far-reaching impacts, the case *sub judice* specifically concerns the duties of the Secretary of the United States Department of the Interior (the "Secretary") and the United States Fish and Wildlife Service (the "USFWS") (collectively, the Federal Defendants) to protect certain endangered and threatened species and their ecosystems, the Comal Springs, the San Marcos Springs, and the Edwards Aquifer (the "Edwards").

2. The United States Supreme Court observed the Endangered Species Act (the "ESA") as "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation." *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 180 (1978). Beyond any doubt, "Congress intended endangered species to be afforded the highest of priorities." *Id.* at 174. "The plain intent of Congress in enacting this statute was to halt and reverse the trend toward species extinction, whatever the cost." *Id.* at 184. The ESA reflects "an explicit Congressional decision to require agencies to afford first priority to the declared national policy of saving endangered species" and "a conscious decision by Congress to

give endangered species priority over the `primary missions' of federal agencies." *Id.* at 185.

3. Quoting from a House Committee report, the Supreme Court echoed Congress' concern both about the unknown uses endangered species might have and about the unforeseeable place such species may have in the chain of life on the earth:

> "As we homogenize the habitats in which these plants and animals evolved and as we increase the pressure for products that they are in a position to supply (usually unwillingly) we threaten their -- and our own -- genetic heritage.
>
> "*The value of this genetic heritage is,* quite *literally, incalculable.*
>
> . . . .
>
> "From the most narrow possible point of view, *it is in the best interest of mankind to minimize the losses of genetic variations.* The reason is simple: they are potential resources. They are keys to puzzles which we cannot solve, and they provide answers to questions which we have not yet learned to ask.
>
> "To take a homely, but apt example: one of the critical chemicals in the regulation of ovulations in humans was found in a common plant. Once discovered, and analyzed, humans could duplicate it synthetically, but had it never existed -- or had it been driven out of existence before we knew of its potentialities -- we would never have tried to synthesize it in the first place.
>
> "Who knows, or can say, what potential cures for cancer or other scourges, present or future, may lie locked up in the structures of plants which

> may yet be undiscovered, much less analyzed? . . . Sheer self interest impels us to be cautious."

Id. at 178 (quoting H.R. Rep. No. 93-412, 87th Cong., at 4-5 (1973)) (emphasis added by Supreme Court).

4. The requirements of the various endangered and threatened species are extremely complex; unfortunately, the earthlings' collective knowledge on these issues is still in the infant stages. Accordingly, any permitted deviations from the natural conditions granting the known requirements should be assumed to harm the endangered and threatened species.

The Edwards Aquifer System

5. The Edwards is a 175 mile long underground conduit and covers an expanse of about 3,600 square miles. (Fed. Def. Consol. Answer at ¶ 10). Although challenged, the Texas Water Commission ("TWC") declared the Edwards to be an underground river. (PX-171). Water enters the Edwards mainly (75%) from surface streams as they cross its recharge area. (Thornhill Testimony; PX-189 at p. 6; P-36 [San Marcos Recovery Plan]). Unless intercepted by human withdrawals, water in the Edwards flows west to east, then northeast, and discharges naturally at springs, especially Comal Springs in New Braunfels and San Marcos Springs in San Marcos. (*Id.*). Water is removed

from the Edwards by withdrawal from wells, interformational movement, and by discharge through spring openings.

6. Although also challenged, the TWC determined the Edwards manifests all the characteristics of a surface watercourse; therefore, the water in the Edwards is owned by the State of Texas in trust for the benefit of the public. (PX-171).

7. The underground formation generally falls in elevation from west to east. (Thornhill Testimony; PX-189 at p. 5). The formation also generally dips toward the Gulf of Mexico. (Thornhill Testimony; PX-189 at p. 5). The piezometric surface of the water (that is, the water level) in the Edwards generally decreases from the west to the east. (Thornhill Testimony; PX-2). The Edwards has two adjacent sub-areas -- a shallower outcrop area where recharge occurs and a deeper artesian area. (Thornhill Testimony).

8. The Edwards is porous and complexly faulted with numerous fractures and solution cavities. The movement of water through the aquifer, except in general terms, is largely undefined. The Edwards Aquifer exists because of the Balcones Fault Zone and to its limestone and dolomite composition. Dissolution of the rock and faulting have created pathways for the water of the Edwards to flow through. Springs, the

natural spill points of the Edwards Aquifer, are all located along major faults. (Thornhill Testimony).

9. A large variability is present in the type and size of the openings in the Edwards Aquifer. The openings range in size from microscopic to large caverns. Many large openings in the subsurface have been encountered while drilling wells. They range from less than a foot to nearly 100 feet; a 90-foot opening has been reported in one well drilled in San Antonio. The relatively large openings are one of the many reasons the Edwards is important and unique. (Thornhill Testimony).

10. Most of the water in the Edwards comes from the flows of surface streams that feed it. (Thornhill Testimony; PX-25; PX-26; PX-189). These streams are located in the upper portion of the Nueces River Basin, the upper portion of the San Antonio River Basin, and a part of the upper portion of the Guadalupe River Basin (the "Contributory Watershed"). (PX-1). Almost all of the base flows and large parts of the flood flows of these streams naturally flow underground to the Edwards through its recharge area. (Thornhill Testimony).

11. The lateral boundaries of the Edwards are: on the north, the northern boundary of the recharge area; on the south, the boundary south of just where the water moves at rates of flow considered insignificant as compared to flow rates north of

the boundary (the boundary is approximated by the "bad-water" line, which separates water containing less than 1000 milligrams per liter of total dissolved solids ("TDS") from water containing more 1000 milligrams per liter of TDS). On the west, the divide near Brackettville in Kinney County separates underground flow toward the Comal and San Marcos Springs from underground flow to the Rio Grande Basin. On the east, the divide northeast of Kyle in Hays County separates underground flow toward the Comal and San Marcos Springs from underground flow to the Colorado River Basin. (PX-189 at p. 5).

12. Water along and south of the "bad-water" line contains much higher concentrations of minerals and is typically charged with hydrogen sulfide. (PX-171; PX-184 at p. 1). Generally, the Edwards is not nearly as porous and permeable south of the "bad-water" line and the water there moves at rates that are insignificant compared to flow rates north of the line. (PX-185 at pp. 19-21).

13. The lower boundary of the Edwards is the underlying Glen Rose Formation. (Thornhill Testimony; PX-189). The upper boundary of the artesian area is the Del Rio Clay. (Thornhill Testimony; PX-189).

14. Water levels at various parts of the Edwards differ, and no *single* well reflects the overall and exact Edwards level. (*See* Thornhill Testimony).

15. The Edwards is a unique ecosystem, which is home to several unique species. (PX-189 at p. 6). Among these is the Texas Blind Salamander, which is listed by the Federal Defendants as endangered. (Shull Testimony; PX-248; DX-20).

16. The Edwards is the major source of water supply for over one million residents of the Edwards region. The Aquifer was designated as the major source aquifer under the Safe Drinking Water Act. *See* 42 U.S.C. § 300f-300g-6. (Aceves Testimony; Moreno Testimony).

17. The Edwards Aquifer supplies the water needs of municipalities, irrigated agriculture, industry, domestic and livestock uses, and several military installations through wells drilled into the aquifer. (Thornhill Testimony; Aceves Testimony).

18. Unquestionably, the Edwards is a natural resource vital to the economies of the aquifer region. (Perryman Testimony). Therefore, the Edwards should be protected.

19. Two groundwater districts have been created under Texas law to manage the Edwards. *Amicus curiae* Edwards Underground Water District ("EUWD") has authority within Bexar, Comal, and Hays

Counties to conserve, preserve, protect and increase the recharge of and prevent the waste and pollution of the aquifer's waters. EUWD is empowered to develop, implement, and enforce drought management plans in order to minimize, as far as practicable, the drawdown of the water table, or the reduction of artesian pressure or spring flow. The EUWD has adopted rules, effective since 1991, requiring pumping reductions of 10% to in excess of 30%, varying with drought conditions. The EUWD has constructed a number of recharge enhancement structures in the Edwards region. The Medina County Underground Water District has authority within Medina County to permit nonexempt wells, limit pumpage, encourage conservation, and prohibit waste of the aquifer's waters and has adopted rules aimed at achieving these goals. (Masters Testimony; DX-8; DX-9; DX-10).

The Comal Springs and San Marcos Springs

20. The rate of spring flow at San Marcos and Comal Springs is generally related to levels of water in the Edwards, although spring flow at San Marcos is somewhat influenced by local recharge. (*See* Thornhill Testimony).

21. The primary natural surface outlets of the Edwards, however, are the multiple, natural spring openings of the two largest

springs in Texas and the entire southwest United States: the Comal Springs at New Braunfels (PX-4; PX-5; PX-7; PX-18) and the San Marcos Springs at San Marcos. (PX-6; PX-19; PX-20). Both of these springs are in the Guadalupe River Basin. (Thornhill Testimony).

22. Spring Lake overlies natural spring openings at San Marcos Springs. (Thornhill Testimony). Landa Lake overlies the lower natural spring openings at the Comal Springs. (Thornhill Testimony).

23. Some of the spring openings at Comal Springs are at a higher elevation than Landa Lake. Springflows from these spring openings flow down spring runs (stream channels) into Landa Lake. (Thornhill Testimony).

24. The Comal Springs are a unique ecosystem. The largest springs in the Southwest, the Comal Springs, are home to one of the only two wild populations of the Fountain Darter, which is listed by the Federal Defendants as an endangered species. (Hubbs Testimony; Shull Testimony; Whiteside Testimony; PX-36). The Comal Springs are also home to a species of salamander which may be the San Marcos Salamander, federally listed as threatened, or the salamander may be a unique species. (Hillis Testimony; Whiteside Testimony; PX-36, PX-248). The Comal Springs are also home to certain species

of invertebrates, which the Federal Defendants have under consideration for listing as endangered or threatened. (Shull Testimony; PX-248; DX-63).

25. The San Marcos Springs are a unique ecosystem, being the second largest springs in the Southwest. The San Marcos Springs are home to one of the only two wild populations of the Fountain Darter which is listed by the Federal Defendants as an endangered species. (Hubbs Testimony; Shull Testimony; Whiteside Testimony; Thornhill Testimony; PX-36). The San Marcos Springs and the San Marcos River downstream of those springs are also home to the San Marcos Salamander, federally listed as threatened, the Texas Wild-rice, federally listed as endangered, and the San Marcos Gambusia, federally listed as endangered. (Hillis Testimony; Shull Testimony; Hubbs Testimony; Power Testimony; Whiteside Testimony; PX-36, PX-248). The San Marcos Gambusia may in fact be extinct, but it has not yet been officially declared extinct by the Federal Defendants. (Hubbs Testimony; PX-41; PX-85).

26. The endangered or threatened species living either at or downstream of the Comal and San Marcos Springs or in the Edwards rely upon adequate and continuous natural flows of fresh water through the Edwards and exiting from the natural

spring openings as an environment for their survival. (Admitted, Fed. Def. Consol. Answer at ¶ 123).

The Threats Posed by Pumping of the Edwards

27. Recharge of the Edwards is highly variable, ranging from 46,000 acre feet per year ("ac-ft/yr") to 2 million ac-ft/yr. (Thornhill Testimony; PX-11).

28. But for human withdrawals, natural discharge from the Edwards at the Comal and San Marcos Springs would likely be stable. (Thornhill Testimony).

29. Water lost from the Edwards by well discharge, interformational movement, or spring discharge could be replenished by surface recharge. The quantity of recharge of the Edwards is dependent upon the amount, rate, and location of rain falling in the aquifer's watershed and recharge areas. Limited structures capturing rainfall and runoff enhancing the recharge have been constructed since recovery efforts for the listed species began. (Thornhill Testimony; Masters Testimony).

30. Pumping from the Edwards rose from about 30,000 ac-ft/yr at the turn of the century to over 500,000 ac-ft/yr in recent years. In dry seasons, pumping is expectedly higher,

especially spring, summer, and drought years. (Thornhill Testimony; PX-10; PX-248).

31. The Comal Springs dried up only once, in 1956, for five months, in the worst year of the "drought of record." (Thornhill Testimony; PX-13).

32. The Comal Springs would not have dried up in the drought of record but for human withdrawals from the Edwards. In the absence of such pumping, the Comal Springs would have flowed at a rate of not less than 150 cubic feet per second ("cfs") on the worst day of 1956. (Thornhill Testimony).

33. During the drought of record in 1956, springflow at the San Marcos Springs slowed to 46 cfs. (PX-15). In the absence of human withdrawals from the Edwards, the San Marcos Springs could flow at a rate of not less than 100 cfs on the worst day of the worst year of the drought of record. (Thornhill Testimony).

34. Pumping from the Edwards, during the ten years up to and including 1956, averaged 219,000 ac-ft/yr and peaked at 321,000 ac-ft/yr in 1956. (PX-10). Pumping during the last 10 years averaged 468,000 ac-ft/yr, peaking in 1989 at 542,000 ac-ft/yr.

35. As a result of pumping, the Comal Springs threatened to dry up in 1984, 1989 and 1990. (Thornhill testimony; PX-34 at p. 1).

These three years were years of droughts having an expected severity of approximately once per decade. (Bomar Testimony).

36. If current levels of withdrawals from the Edwards are allowed to continue without control or additional water supply, both the Comal and San Marcos Springs potentially will cease to flow for years during either a repeat of the drought of record or a worse drought. Further, both springs will cease to flow during milder droughts with a shorter duration than the drought of record. (Thornhill Testimony; PX-171; DX-169 at pp. 2, 3, 5-1, 5-67).

37. If current levels of withdrawals are allowed to continue without reduction, endangered and threatened species will be taken, damaged, or destroyed; their designated critical habitat destroyed or adversely modified; and their continued existence severely jeopardized during dry periods or relatively mild droughts. (Thornhill Testimony; PX-34; PX-35; PX-36; PX-171; DX-169).

38. Dry periods and relatively mild droughts occur with some frequency in Texas. (Thornhill Testimony; Bomar Testimony).

39. Pumping from the Edwards has been and remains effectively unregulated. (Hall Testimony; Spear Testimony; Aceves Testimony). Although the Board of Directors of the EUWD did adopt a Demand Management Plan, with concomitant rules

implementing the plan, and a Edward-Balcones Fault Zone Aquifer (the "Aquifer Management Plan").

40. The Edwards is overdrafted; meaning, more water is withdrawn every year than its "firm yield" in the drought of record. (Thornhill Testimony; Spear Testimony; Masters Testimony; Aceves Testimony).

41. Without some regulation of pumping, the Comal and San Marcos Springs will have cyclical drying-up periods with the potential of permanently drying up. (*See* Thornhill Testimony; PX-36; DX-169).

42. The TWC noted, "overdrafting of the Aquifer itself may allow the intrusion of highly mineralized water from underground water adjacent to the [Edwards] otherwise held in check because of the hydrostatic pressure of the Aquifer." (PX-189 at p. 8).

43. A 1986 study published by the United States Geological Society ("USGS") estimated, under conditions of the "worst case" during a repeat of the drought of record, the bad-water would migrate 0.2 miles into the fresh water of the Edwards. Consequently, 11,300 acre-feet of bad water and 76,900 tons of pollutants would be discharged into the fresh water each year. (PX-250).

44. Under the "worst case" estimate in the 1986 USGS report, there would be 22,400 acres of land overlying the Edwards (0.2 miles multiplied by 175 miles), within which existing and future wells supplying water for domestic, municipal, industrial, and irrigation uses would be jeopardized. (PX-250).

45. Under the "worst case" estimate in the 1986 USGS report, 3.7 billion gallons of bad-quality water would be discharged into the fresh water each year. (PX-250).

46. Under the "worst case" estimate in the 1986 USGS report, 154 million pounds of pollutants would be discharged into the fresh water each year. (PX-250).

47. The TWC was advised of the high likelihood the "worst case" estimate made in the 1986 USGS Report *may not be* the worst case. (*See* PX-162). However, the TWC made no determination on this issue. (Masters Testimony, Aceves Testimony; *see* PX-189).

48. In addition to the threat of contamination from the discharge of bad-quality water from south of the bad water line, there also appear to be areas of bad-quality water within the fresh-water portion of the Edwards. These areas presumably exist because there is minimal flow of water in these areas. If the Edwards is drawn down to historical lows, presumably there

will be discharge of bad-quality water from these areas into fresh water. (Thornhill Testimony).

49. Hydrogen sulfide is one of the pollutants in the bad water, both south of the bad water line and in the isolated areas of bad water within the fresh water zone. (Thornhill Testimony). Hydrogen sulfide is a hazardous substance as defined under federal law. *See* 16 U.S.C. § 1261; 40 C.F.R. § 302.4, Table 302.4.

50. A recent study conducted by the EUWD shows the bad water line is much closer to the Comal and San Marcos Springs than was previously assumed. In fact, the study shows the bad water line is located directly beneath the Springs. (PX-184). Bad water has been withdrawn from a well located approximately 300 feet from major spring openings at the San Marcos Springs. (Thornhill Testimony).

51. The USFWS is concerned about threat the movement of bad water, due to overdrafting of the Edwards, may pose to endangered and threatened species. (PX-34, PX-132).

52. If the Comal Springs ceases to flow, there is a risk the bad-quality water containing a hazardous substance will move into fresh water near the spring openings and be discharged out the spring openings when the aquifer levels rise. (Thornhill Testimony; PX-34, PX-132).

53. The surest and most prudent method of ensuring the inexistence of significant adverse water quality impacts, due to pumping from the Edwards, is to limit pumping to the extent necessary to maintain adequate, continuous natural springflows from the Comal Springs at all times. Uncertainties of human knowledge prevent reducing the Edwards level any lower. (*See* Thornhill Testimony).

54. The Texas Department of Water Resources ("TDWR"), the TWC, the EUWD and the City of San Antonio agree: if the Edwards were pumped down too far (presently an unquantifiable figure), movement of bad water could permanently and irreversibly ruin the Edwards. (Thornhill Testimony; Hall Testimony; Masters Testimony; Aceves Testimony; PX-75; PX-189; PX-132 (3/91 letter); PX-171; DX-169).

Endangered Species Act Specifics

55. The ESA promulgates the Federal Defendants as the lucky leading Federal agency-in-charge of protecting endangered and threatened species. *See* 16 U.S.C. § 1531, *et seq.*

56. Pursuant to the ESA, 16 U.S.C. § 1533(a)(1), the Secretary *is required* to determine whether any species is an endangered or threatened species because of any of the following factors: (a) the present or threatened destruction, modification or

curtailment of its habitat or range; (b) over-utilization for commercial, recreational, scientific, or educational purposes; (c) disease or predators; (d) the inadequacy of existing regulatory mechanisms; or (e) other natural or man made factors affecting its continued existence.

57. Under 16 U.S.C. § 1533, the Secretary must determine which species are the endangered or threatened species "solely on the basis of the best scientific and commercial data available to him after conducting a review of the status of the species and after taking into account those efforts, if any, being made by any state or foreign nation, or any political subdivision of the state or foreign nation, to protect such species, whether by predator control, protection of habitat and food supply, or other conservation practices, within any area under its jurisdiction, or on the high seas."

58. Under 16 U.S.C. § 1533(c), the Secretary is required to publish in the Federal Register a list of all species determined by either the Secretary of the Interior or the Secretary of Commerce to be an endangered or threatened species.

59. Under 16 U.S.C. § 1532(6), "the term 'endangered species' means any species which is in danger of extinction throughout all or a significant part of its range other than the species

of the Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this chapter would present an overwhelming and overriding risk to man."

60. Under 16 U.S.C. § 1532(20), "the term `threatened species' means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant part of its range."

61. Region 2 of the USFWS, which includes, Texas, New Mexico, Arizona, and Oklahoma, has responsibility for the endangered and threatened species at issue in this lawsuit. (Spear Testimony; DX-19 at cover page).

62. The species at issue currently listed under the ESA and the geographical areas occupied by these species are described below:

    a. Fountain Darter (*Etheostoma fonticola*), which is listed in 50 C.F.R. § 17.11 (1988) as endangered. The State of Texas recognized the Fountain Darter (*Etheostoma fonticola*) as an endangered species. 31 Tex. Admin. Code Ann. § 65.183 (1989). The entire known world population of the Fountain Darter in the wild is found at Comal Springs (in the spring runs above Landa Lake, in Landa Lake, and in a segment of the Comal River downstream of Landa Lake) and at San Marcos Springs (in Spring Lake and a segment of the San Marcos River downstream of Spring Lake). The Fountain Darter commonly sinks to the bottom of the river channel due to its small swim bladder. (*See* Whiteside Testimony; Schenck Testimony; PX-23; DX-10 at p. 41).

b. San Marcos Gambusia (*Gambusia georgei*), which is listed in 50 C.F.R. § 17.11 (1988) as endangered. The State of Texas recognizes the San Marcos Gambusia (*Gambusia georgei*) as an endangered species. 31 Tex. Admin. Code Ann. § 65.183 (1989). The entire known world population of the San Marcos Gambusia in the wild was found in a segment of the San Marcos River downstream of Spring Lake. None have been found in the wild since 1985. Although uncertain, the San Marcos Gambusia's disappearance is possibly attributable to the application of herbicide on banks of the river or maybe hybridization. (*See* Hubbs Testimony; PX-24; DX-21; DX-98).

c. Texas Wild-rice (*Zizania texana*), which is a member of the plant family *Poaceae*, Texas Wild-rice, listed in 50 C.F.R. § 17.12 (1988) as endangered. The State of Texas recognizes Texas Wild-rice (*Zizania texana*) as an endangered species. Tex. Parks and Wild. Code Ann. § 88.002 (Vernon Supp. 1990). The entire known world supply of Texas Wild-rice in the wild is found in Spring Lake and a segment of the San Marcos River downstream of Spring Lake. (*See* Power Testimony; Shull Testimony; PX-21; PX-32; DX-10 at p.41).

d. San Marcos Salamander (*Eurycea nana*), which is listed in 50 C.F.R. § 17.11 (1988) as threatened. The State of Texas recognizes the San Marcos Salamander (*Eurycea nana*) as a threatened species. 31 Tex. Admin. Code Ann. § 65.173 (1988). The entire known world population of the San Marcos Salamander in the wild is found at natural spring openings of the San Marcos Springs, and possibly also at natural spring openings of the Comal Springs, and in the gravels and immediate spring runs associated with the openings. (*See* PX-22; *cf.* Hillis Testimony; DX-21; DX-98).

e. Texas Blind Salamander (*Typhlomolge rathbuni*). This species is listed by the federal government as endangered at 50 C.F.R. § 17.11 (1988). The State of Texas recognizes the Texas Blind Salamander (*Typhlomolge rathbuni*) as endangered. 31 Tex. Admn. Code Ann. § 65.183 (1989). The entire known world population of the Texas Blind Salamander in the wild is found underground in the

Edwards in a relatively small segment of the Edwards near the San Marcos Springs. (*See* PX-30).

63. Recently, two new, rare and possibly endangered species have been discovered in the Comal Springs. (PX-228). The new discoveries include the dryopid beetle, which is also a genus; meaning, the beetle is unique and deserves its own classification. Comal Springs is thought to be the only place in the world where the dryopid beetle is found. A species of the riffle beetle, found in the Comal Springs, was described as endemic to the Comal system. Each of these species has been proposed for listing under the ESA. (Shull Testimony; PX-248).

64. Section 4 of the ESA provides, the Secretary "shall develop and implement" what is known as a "recovery plan" for each endangered species, unless he finds that it "would not promote the conservation" of the species to do so. 16 U.S.C. § 1533(f).

65. Some agency actions are exempt from judicial review "as actions committed to agency discretion by law." (Fed. Def. Br. at p. 4). However, an action is "committed to agency discretion" where there is "no law for the court to apply." *Heckler v. Chaney*, 470 U.S. 821, 830 (1985). In the case at bar, a statute commands the agency to act, "there is law to

apply" and this Court "may review whether the agency acted in accordance with Congress' wishes." *Thomas Brooks Chartered v. Burnett*, 920 F.2d 634, 642 (10th Cir. 1990); *see also Brock v. Pierce County*, 476 U.S. 253, 260 n.7 (1986) (where statutory command is that agency "shall" act, complainant adversely affected by failure to act can bring an action in District Court). Section 4 of the ESA commands the Secretary to "develop" and "implement" recovery plans.

66. The Administrative Procedures Act (the "APA") standard to which Federal Defendants refer does not limit the Court to review for "arbitrary and capricious" agency action or inaction. The APA permits the Court to correct agency action considered an abuse of discretion, otherwise not in accordance with law, or without observance of procedures required by law. *Friends of Endangered Species, Inc. v. Jantzen*, 760 F.2d 976, 981-82 (9th Cir. 1985). And the court is free to subject the agency's action to "thorough probing, in-depth review." *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402, 415 (1971). An abuse of discretion occurs when an agency which Congress mandates "shall develop and implement a recovery plan" refuses to act on the behalf of species the USFWS knows were in "imminent peril" in 1989 and 1990.

67. The Federal Defendants claim Plaintiffs have "no legal basis" for asserting the Federal Defendants have a nondiscretionary duty under ESA § 4 to identify and communicate the Comal and San Marcos species' springflow requirements. (Fed. Def. Br. at p. 14). To the contrary, § 4 of the ESA provides the USFWS shall determine what species are endangered or threatened and list them; shall designate their critical habitat; and "shall develop and implement" what are known as "recovery plans" -- plans for the "conservation and survival" of listed species. 16 U.S.C. § 1533. Priority is to be given to species whose survival is in conflict with economic activities, such as withdrawals of water from the Edwards. 16 U.S.C. § 1533(f).

68. The "conservation" § 4 recovery plans seek is defined by statute as "to bring any endangered and threatened species to the point at which the measures provided pursuant to [the ESA] are no longer necessary." 16 U.S.C. § 1532(3).

69. At least in the circumstances of this case, the ESA § 4 duty to develop and implement a plan is mandatory, not discretionary. The ESA says that he "shall" develop and implement such recovery plans. 16 U.S.C. § 1533(f). There is one stated exception: "Unless he finds that such a plan will not promote the conservation of the [endangered] species." *Id.* The Federal Defendants have never claimed that this

exception applies to the present case. The Secretary's failure to develop and implement recovery plans permits this Court to review whether the USFWS has acted in accordance with Congress' wishes.

70. Both the Federal Defendants and the Defendant-Intervenors argue the Secretary has discretion to set priorities and determine whether recovery plans will conserve the species. (Fed. Def. Br. at p. 15; Def. Int. Br. at p. 17) (citing *National Wildlife Fed'n v. National Parks Serv.*, 669 F. Supp. 384 (D. Wyo. 1987)). *National Wildlife Fed'n* stands the proposition that, if there exists sufficiently clear justification arising out of facts developed after completion of a recovery plan, the Secretary can temporarily delay implementation of a recovery plan. 669 F. Supp. at 387 (Secretary decided to delay decision on closing campground, pending results of environmental impact statement due to be released within year and which used "the most sophisticated methods to date" to measure human impact on Grizzly Bears).

71. The facts in the instant are markedly different. For eight years, the Federal Defendants failed to implement the existing San Marcos Recovery Plan, and they failed to develop a plan for Comal Springs. They never identified the necessary springflow requirements of the species. The Federal

Defendants argue that "particularly in light of the severe budget constraints" their duty to develop and implement a recovery plan should be discretionary. (Fed. Def. Br. at p. 16). This Court refuses to legislate a new exception reading: "the Secretary shall develop and implement a recovery plan *unless* he claims, or suspects, that "tight budget constraints" make develop or implementation of a recovery plan inconvenient or difficult to reconcile with the needs of other species, in which case he may or may not develop and implement a plan, when and if he pleases. Moreover, under the case law, the argument that budget constraints make the duty to plan discretionary is without merit. *See Northern Spotted Owl v. Lujan*, 758 F. Supp. 621, 629 (W.D. Wash. 1991) (budgetary excuse insufficient to justify continued inaction even though the facts proved "prodigious resources" and a "truly remarkable effort" had already been made by the Forest Service).

72. The plans are supposed to spell out what is biologically required to prevent extinction and permit recovery of endangered species. (Shull Testimony).

73. Priority is to be given to species whose survival is in conflict with economic activities, such as withdrawal of water from the Edwards. 16 U.S.C. § 1533(f).

74. Section 9 of the ESA prohibits "any person" from "taking" a member of any endangered species without a permit. 16 U.S.C. § 1538(a). "Take" as used in § 9 includes not only "kill" but also "harm or harass." 16 U.S.C. § 1532(19). "Harm" and "harass" are defined to mean "disrupt[ing] or significantly impair[ing]" behavioral patterns including "breeding, feeding and sheltering." 50 C.F.R. § 17.3.

75. Section 7(a)(1) of the ESA requires all Federal agencies to "utilize their authorities in furtherance of the purposes of [the ESA] by carrying out programs for the conservation of endangered species and threatened species." 16 U.S.C. § 1536(a)(1).

76. Section 7(a)(2) of the ESA requires every Federal agency, in consultation with the Secretary, to "insure that any action authorized, funded or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of any [designated critical habitat]." 16 U.S.C. § 1536(a)(2). "Jeopardize the continued existence of" means "to engage in an action that unreasonably would be expected directly or indirectly to reduce appreciably the likelihood of both the survival and recovery of a listed

species in the wild by reducing the reproduction, numbers or distribution of that species." 50 C.F.R. § 402.02.

77. Section 9(a)(2) of the ESA makes it unlawful for "any person to damage or destroy any [listed plant] species . . . in knowing violation of any law or any regulation of any State or in the course of any violation of a State criminal trespass law." 16 U.S.C. § 1538(a)(2).

78. In order to deal with conflicts between the survival requirements of endangered species and their habitats, on the one hand, and human economic activity, on the other hand, § 10(a) of the ESA allows the Federal Defendants to issue "incidental take permits." The incidental take permits allow the death, harm, or harassment of individual members of an endangered species, even substantial numbers of such individuals, as long as (1) this is an unintentional result of an otherwise lawful activity, such as pumping groundwater; (2) the species' survival is not jeopardized; and (3) measures are taken to "minimize and mitigate the impact of such taking." (16 U.S.C. § 1539(a); Spear Testimony; PX-34; PX-35).

79. In order to deal with severe and unavoidable conflicts between the survival requirements of endangered species, on the one hand, and actions of regional or national significance whose

benefits clearly outweigh the benefits of every alternative course of action consistent with conserving the species, on the other hand, § 7(h) of the ESA allows a special, high-level committee to authorize the extinction of an endangered species under certain circumstances. 16 U.S.C. § 1536(h).

80. The endangered or threatened species, at or downstream of the Comal and San Marcos Springs, rely on adequate and continuous natural flows of fresh water through the Edwards and exiting from the natural spring openings of those springs as an environment for their survival. The endangered species living in the Edwards similarly rely upon adequate water levels in the Edwards and adequate and continuous flows of fresh water through the Edwards to the Comal and San Marcos Springs as an environment for their survival. (Admitted. Fed. Def. Consol. Answer at ¶ 123).

<u>Takes of and Jeopardy to Fountain Darters</u>

81. Pursuant to the following discussion, by the time springflow at Comal Springs declines to approximately 100 cfs, "harm," constituting "take," occurs to the endangered Fountain Darter.

82. In the letter of March 26, 1992, the USFWS notified the TWC that by the time Comal springflow has declined to 100 cfs, harm to Fountain Darters, "which likely constitutes `take,'

has occurred to endangered species," specifically the Fountain Darter. (PX-34 at p. 3).

83. The March 26, 1992 USFWS letter and attached comments to the TWC represented the USFWS' best professional judgment with regard to the application of §§ 7, 9, and 10 of the ESA to the protection of endangered and threatened species at Comal Springs. (Admission No. 2; Spear Testimony). The March 26, 1992 USFWS letter and comments were based upon the expert opinions of USFWS staff biologists and hydrologist (Admission No. 3, Spear Testimony, Shull Testimony), together with the views of others with whom USFWS consulted, including Texas Parks and Wildlife Department ("TPWD") biologist Randy Moss. (Shull Testimony).

84. By the time the springflows at Comal Springs have dropped to approximately 100 cfs, the upper spring run (known as "Spring Run J" or "Spring Run 1" and hereinafter referred to as "Spring Run J") has dried up. (Thornhill Testimony; PX-17; PX-34, comments at p. 3). The normal flowing Spring Run J provides suitable habitat for the Fountain Darters living in Spring Run J. (Whiteside Testimony; Hubbs Testimony; Moss Testimony; PX-16; PX-244). As Spring Run J dries up, Fountain Darters lose the vegetation on which they depend. (Whiteside Testimony; PX-34, comments at p. 3; PX-244). As Spring Run J

dries up, Fountain Darters are trapped in isolated pools and either die of lack of oxygen or are eaten by predators. (Whiteside Testimony; Moss Testimony; PX-34, comments at p. 3; PX-244).

85. In the summer of both 1989 and 1990, Fountain Darters were harmed or killed. (Whiteside testimony). Fountain Darters died due to declining water levels in Spring Run J in the summers of 1989 and 1990. (Moss testimony). If the upper springs runs dry up, Fountain Darters could be stranded in pools, if pools form. (PX-244). Isolated pools were formed in 1989 and 1990 as Spring Run J dried up. (Thornhill Testimony; Whiteside Testimony; Moss Testimony; PX-17; TPWDX-4). Dr. Whiteside and Dr. Brandt collected Fountain Darters as part of a rescue operation. They were recorded as "thin," due to interference with their feeding habitat. (Whiteside Testimony; PX-139; PX-244).

86. Comal Springs dropped below 100 cfs for 99 days in 1989, to a low of 46 cfs. Comal Springs dropped below 100 cfs for 28 days in 1990, to a low of 67 cfs. (Thornhill Testimony; PX-205).

87. Considering the discussion below, the Court reasonably finds the Federal Defendants' failure or refusal to develop and implement recovery plans caused or allowed the taking of, and

caused or risked jeopardy to, the Fountain Darter in the dry years of 1989 and 1990.

88. By the time Comal Springs cease flowing completely, jeopardy to the endangered Fountain Darter has occurred. There has been an appreciable reduction in the likelihood of both the survival and recovery of the Fountain Darter in the wild, by reducing its reproduction, numbers, and distribution. This result is clearly contrary to the purpose and goals of the Endangered Species Act. (*See* FF 80 through 84, below).

89. In the March 26, 1992 USFWS letter and comments, the USFWS told the TWC: "By the time Comal Springs cease flowing completely, jeopardy [within the meaning of § 7 of the ESA] has occurred." (PX-34 at p. 2). Further: "By the time Comal Springs cease to flow completely, there has been an appreciable reduction in the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, and distribution of the species. This result is clearly contrary to the purpose and goals of the [ESA]." (*Id.*, comments at pp. 2-3). The March 26, 1992 USFWS letter and attached comments represent the USFWS' best professional judgment, based on the views of experts on its staff and outside experts with whom they consulted.

90. As the USFWS advised the TWC on March 26, 1992: "[A]ll activities [of Federal agencies, or of State, local or private entities to the extent Federal activities authorize, fund or carry them out] must ensure that the Comal Springs are maintained at or above [the jeopardy] level." (PX-34 at p. 2).

91. Maintaining springflow at Comal Springs is essential to preventing jeopardy because "it is hard to have an aquatic ecosystem without any water." (Whiteside Testimony). As the Defendant-Intervenors' own Fountain Darter expert acknowledged, "we would have slipped up big-time" if Comal and San Marcos Springs ceased flowing. (Schenk Testimony).

92. Essential to the conservation and survival of the Fountain Darter is the maintenance of both wild populations, the population at Comal Springs and the population at San Marcos Springs. If only one wild population exists, the Fountain Darter is at much greater risk of extinction due to a single catastrophic event (such as an accidental oil or chemical spill) or a deliberate poisoning (such as the poisoning of Treaty Oak in Austin). (Spear Testimony; Shull Testimony; Hubbs Testimony). Except in a drought so severe that the springs would dry up with no pumping, Comal Springs could not go dry without jeopardy occurring. (Spear Testimony).

93. "Jeopardy" is inherently a matter for determination by the exercise of professional judgment. (Shull Testimony; PX-245).

94. The USFWS has not yet exercised its best professional judgment to determine where, above 100 cfs, Fountain Darters at Comal Springs first began to be taken or where, above 0 cfs, jeopardy to the Fountain Darter has occurred. (Spear, Shull Testimony; PX-34).

95. According to the USFWS, Fountain Darter habitat begins to be lost in Spring Run J as Comal Springflow drops to about 150 cfs. (PX-34, comments at p. 3). TPWD biologist Randy Moss testified the decreasing springflow at Comal Springs leads to harm and harassment, and likely to death, of Fountain Darters as the depth of water drops to between four and six inches in Spring Run J. (Moss Testimony). Dr. Whiteside testified the decreasing springflow at Comal Springs significantly reduces Fountain Darter habitat on Spring Run J as the depth of water drops below four inches. Dr. Hubbs testified harm begins to be significant as the depth of flow in Spring Run J drops to twelve inches. Paul Thornhill testified, based on surveys of Spring Run J and hydrological models, he can promptly convert a given depth of flowing water the biologists say is required in Spring Run J to a Comal Springs flow rate in cfs and an Edwards level at index well J-17. (Thornhill testimony; PX-7;

PX-226). Four inches and twelve inches of water in Spring Run J immediately upstream of the footbridge are equivalent to 118 cfs and 385 cfs, respectively. (*Id.*).

96. Comal Springs came perilously close to drying up in both 1989 and 1990. (Thornhill Testimony; PX-34 at p. 1). As the rains of 1992 repressed any drought concerns, in 1989 and 1990, unusual mid-summer rains saved the springs. (Whiteside Testimony; Bomar Testimony).

97. The direct human cause of low springflows at Comal Springs and resulting takes of and jeopardy or near jeopardy to Fountain Darters in 1989 and 1990 was excessive pumping from the Edwards. (Thornhill Testimony, Spear Testimony).

Takes of and Jeopardy to Other Animal Species at Comal and San Marcos Springs and in the Edwards

98. The USFWS never determined, nor stated its best professional judgment of, the "minimum continuous natural springflow rates" at San Marcos Springs which jeopardize the Fountain Darter, the San Marcos Salamander, and the likely extinct San Marcos Gambusia, if found at San Marcos springs. If it came forth with the springflow rates, that could jeopardize these species or the candidate species found there. (Shull Testimony; Spear Testimony; Masters Testimony; Aceves Testimony; Admission 8).

99. The USFWS has never determined, nor stated its best professional judgment of, the minimum continuous natural springflow rates at Comal Springs which would jeopardize the San Marcos Salamander, if found at Comal Springs. If it came forth with springflow rates, that could jeopardize the possible new species of salamander found there, or the candidate species found there. (Shull Testimony, Spear Testimony, Masters Testimony, Aceves Testimony; Admission 8).

100. The USFWS has never determined, nor stated its best professional judgment of, the minimum continuous natural springflow rates at Comal and San Marcos Springs, or the minimum Edwards levels, which would jeopardize the Texas Blind Salamander, if found at Comal and San Marcus Springs. If it came forth with the springflow rates, that could jeopardize the Texas Blind Salamander or the candidate species found there. (Shull Testimony, Spear Testimony, Masters Testimony, Aceves Testimony; Admission 8).

Destruction or Adverse Modification of Critical Habitat of Texas Wild-rice, Damage to or Destruction of Texas Wild-rice, and Jeopardy to Texas Wild-rice

101. The USFWS never determined, nor stated in its best professional judgment, the minimum continuous springflow rates at San Marcos Springs at which destruction or adverse

modification of critical habitat of Texas Wild-rice, damage to or destruction of Texas Wild-rice, or jeopardy to Texas Wild-rice, begin to occur. (Shull Testimony, Spear Testimony, Masters Testimony, Aceves Testimony, Power testimony; Admission 8).

102. Adverse modification of the critical habitat of Texas Wild-rice, and damage to or destruction of Texas Wild-rice, have occurred by the time the depth of flowing water where established stands of Texas Wild-rice grow in the San Marcos River at Transect 12 has fallen to 1.5 feet. (Power Testimony). Transect 12 is a cross-section of the San Marcos River uninfluenced by dams, upstream from the sewage treatment plant. (PX-231).

103. As the San Marcos springflow drops, by the time springflow has dropped to 100 cfs, the depth of water in the San Marcos River at which one or more established stands of Texas Wild-rice exist has dropped to 1.5 feet or less. (Power Testimony; Thornhill Testimony; PX-230).

104. During the ten-year period from 1981 through 1990, springflow at the San Marcos Springs dropped below 100 cfs in three years: 1984, 1989, and 1990. (Thornhill Testimony; PX-15; PX-206).

105. Springflow from the San Marcos Springs was below 100 cfs on 169 days in 1984, 140 days in 1989, and 85 days in 1990. (Thornhill Testimony; PX-15; PX-206).

106. One or more established stands of Texas Wild-rice growing in the bed of the San Marcos River were damaged or destroyed, and their critical habitat was adversely modified, in 1984, 1989, and 1990, due to low springflows. (Power Testimony).

107. Texas Wild-rice grows in the wild only in Spring Lake and in the bed of the San Marcos River in a segment of the river downstream of Spring Lake. (Power Testimony).

108. Although *obiter dictum*, the Court is of the opinion the bed of the San Marcos River downstream of the natural spring openings is owned by the State of Texas. Because the grant from the sovereign expressly did not include the stream, the State retained title to the stream bed. *See, e.g., Heard v. Town of Refugio*, 103 S.W.2d 728, 731 (Tex. 1937)) (*See* PX-200; PX-201; PX-202; PX-203; PX-234).

109. The water in Spring Lake and the water flowing in the San Marcos River downstream of Spring Lake was judicially determined to be owned by the State of Texas in trust for the benefit of the public. (PX-234).

110. Although *obiter dictum*, the Court is of the opinion the Texas Wild-rice growing in the bed of the San Marcos River is owned

by the State of Texas. (PX-200; PX-201; PX-202; PX-203; PX-234).

Critical Importance of Developing and Implementing Recovery Plans

111. Increasingly, recovery plans are the fundamental tool the USFWS uses to protect endangered species. (Spear Testimony).

112. Timely development and implementation of recovery plans is critical to many specific recovery actions, including designing and funding required studies and securing cooperation from other federal, state, regional, and local governmental and private entities. (Spear Testimony; PX-66).

113. As the USFWS told the United States Congress in December of 1990, "perhaps the most essential ingredient for the development and implementation of an effective recovery program" is "[c]oordination among Federal, State and local agencies, academic researchers, cooperation organizations, private individuals, and major land users . . . ," with the USFWS being the "coordinator." (PX-198 at p. 3).

114. In the case of the Comal and San Marcos ecosystems and listed species, the most basic purpose of recovery planning is to establish a baseline flow condition -- flows prohibited from reduction by human activities -- and disseminate the

quirements necessary for the protection of the baseline flows. (Spear Testimony).

Failure to Develop a Recovery Plan for the Comal Springs Ecosystem and Species

115. The Federal Defendants failed to develop any recovery plan or plans to secure the survival and recovery of any of the species at issue explicitly through protection of the Comal Springs. (Admitted. Fed. Def. Consol. Answer at ¶ 169).

116. While the existing San Marcos Recovery Plan contains references to Comal Springs, it addresses the protection of the San Marcos ecosystem, not the Comal Springs ecosystem. (Shull Testimony; PX-36).

117. The USFWS does not claim a recovery plan explicitly addressing protection of the Comal Springs ecosystem would "not promote the conservation of the species" of Comal Springs. (Spear Testimony).

118. For more than three years, the USFWS has had under consideration the revision of the San Marcos Recovery Plan to explicitly address protection of the Comal Springs. (Shull Testimony; PX-2; PX-39; PX-248). Meanwhile, Comal Springs twice reached a dire situation in which the springs nearly dried up. (Whiteside Testimony; PX-34; PX-97; PX-244).

Failure to Develop a Recovery Plan for the Texas Blind Salamander

119. Neither the San Marcos Recovery Plan nor any other recovery plan addresses the conservation and survival of the Texas Blind Salamander. (Admission 18; Shull Testimony; PX-36).

120. Federal Defendants claim the Secretary made a finding that a recovery plan for the Texas Blind Salamander will not promote the conservation and survival of the species. (Federal Defendants' Memorandum in Opposition to Plaintiffs' Motion for Summary Judgment and in Support of Federal Defendants' Cross-Motion for Summary Judgment at p. 31).

121. The evidence does not support the Federal Defendants' claim. The earliest relevant document, a December 1990 report to Congress, says only the only possible recovery measure for the Texas Blind Salamander was to "continue efforts to protect Edwards Aquifer from drawdown and pollution." (PX-198). A May 1991 document prepared by the regional herpetologist for the USFWS is entitled "Recovery Outline, Texas Blind Salamander," and states the Texas Blind Salamander is "under threat by water use practices" and that "a recovery plan has yet to be written." (PX-131). A February 19, 1992 memorandum from Regional Director Spear to USFWS Director Turner states: the "status" of the Texas Blind Salamander "unknown"; the only place the Texas Blind Salamander "is known to occur is in the

Edwards Aquifer underground"; and "[u]ntil additional information is available, the preparation of a recovery plan will be held in abeyance." (PX-199). On May 7, 1992, the Federal Defendants admitted "that FWS has not 'developed' [a] recovery plan that explicitly address[es] the Texas Blind Salamander, but avers that development of such a recovery plan is under consideration by the [USFWS]." (Admission No. 18). A May 18, 1992 USFWS briefing memorandum prepared for Director Turner stated the "new plan will better address the Comal Springs ecosystem and will also include the Texas Blind Salamander." (PX-248). Dr. Brandt of the USFWS never heard anyone say a recovery plan for the Texas Blind Salamander is not needed. (Brandt Testimony).

122. The Federal Defendants demonstrated no rational basis for a finding that a recovery plan for the Texas Blind Salamander "would not promote the conservation of the species." The usual basis for such a finding is that a recovery plan identifying the locations where, for example, an endangered plant is found would expose it to collectors. Salzman, *Evolution and Application of Critical Habitat Under the Endangered Species Act*, 14 Harv. Env. L. Rev. 311, 334 (1990); *see also Endangered Species* Act *Amendments of 1978; House Report of Merchant Marine and Fisheries Committee*, 95th Cong.,

2d Sess. 17 (1978). The basis does not apply to the Texas Blind Salamander. The USFWS considers the status and location of the Texas Blind Salamander unknown, but under threat due to water-use practices. (PX-131; PX-199). The threats to which the Texas Blind Salamander are exposed in its underground habitat include being drawn up wells, and do not apply to the other species at issue. They also include threats, such as lowering of the Edwards level and movement of bad water, which may apply differently to the Texas Blind Salamander than to the other species.

Failure to Implement Essential Features of the San Marcos Recovery Plan Dealing with the Greatest Threat

123. The USFWS failed or refused to implement practices recognized in its own documents, including the San Marcos Recovery Plan, as critical to save the species at issue from extinction.

124. In the early 1980s, with the aid of the San Marcos Recovery Team composed of scientists chosen by the USFWS, the USFWS developed the San Marcos Recovery Plan, and adopted it in 1985. (Spear Testimony; Shull Testimony; PX-36; PX-55; PX-66).

125. The San Marcos Recovery Plan correctly states, the "most serious threat to the continued existence of the San Marcos

River ecosystem" and the biota comprising the system is "the cessation of flow of thermally constant clear, clean water from the San Marcos Springs due to overdrafting of the groundwater from the Edwards Aquifer." (PX-36). The USFWS maintains this view. (Spear Testimony). The same threat exists for the Comal ecosystem. (Spear Testimony). "The listed species will become extinct unless an aquatic habitat with appropriate volume, flow and quality characteristics is maintained in the Comal and San Marcos Ecosystems." (Shull Decl. at p. 11; attached to Fed. Defs. Summary Judgment Papers.).

126. The San Marcos Recovery Plan states, the species at San Marcos can be downlisted to threatened "when it is assured that flow in the San Marcos River will continue within its natural cycle of variation." (PX-36). Until December 1989, the Federal Defendants took no action to assure the quantity of flow in the San Marcos River would continue within its natural cycle of variation. (Admitted; Fed. Def. Consol. Answer at ¶ 69).

127. The San Marcos Recovery Plan identifies several "major steps" needed for protection of the San Marcos species and their ecosystem. (PX-36).

Define Minimum Springflow

128. One "major step" was "identify requirements," including flow and habitat requirements. (PX-36 at p. 69). The San Marcos Recovery Plan explained the requirements were not well understood. (*Id.* at p. 69).

129. After the instant suit was filed, the Federal Defendants took some steps to identify the minimum continuous springflow requirements of any of the endangered and threatened species relevant to this lawsuit. (Admissions 26(c), 27(c)). As recently as May, 1992, the USFWS had neither funded, nor requested anyone else to voluntarily and at their own expense to perform, any studies to determine such minimum continuous springflow requirements. (Admission 9). Since suit was filed, the USFWS has not determined any of the minimum springflow requirements of any of the species at issue at either springs except the Fountain Darter at Comal Springs to the limited extent reflected in the March 26, 1992 USFWS letter and comments to the TWC. (PX-34).

130. While the EUWD maintains the USFWS acted reasonably in prioritizing its efforts to enforce the ESA and to protect endangered species in light of budgetary constraints and the large number of endangered species it is charged to protect, the fact the USFWS has not acted as required remains.

131. Knowledge of the minimum springflow requirements of the species is vital to any Federal, State, regional, or local government or private entity which wishes to take action to protect the species at issue from the greatest threat they face. These entitities seek to avoid action adding to the threat, or wish to avoid the consequences of the "blunt axes" of Federal intervention forged by Congress under ESA §§ 7 and 9 to protect the species. (Spear Testimony; Shull Testimony; Specht Testimony; Masters Testimony; Aceves Testimony; Hall Testimony).

132. The EUWD claims authority to regulate pumping from the Edwards, and to have protection of endangered species habitat as one of the goals of such regulation. (Masters Testimony). One goal of the EUWD is new "Demand Management Plan for the Edwards-Balcones Fault Zone Aquifer" is to "ensure an adequate level of springflow" to "protect habitats within the District dependent on the Edwards Aquifer." (EUWDX-6). However, the EUWD does not know what quantity of minimum springflows at the Comal or San Marcos Springflows needs to be protected. (Masters Testimony). The EUWD on May 10, 1991 made a formal request to Regional Director Spear for a declaration of the minimum springflows the USFWS will accept as adequate under the ESA to protect the species and their habitat at San Marcos

Springs. (PX-132). The USFWS has not answered the EUWD's request. (Spear Testimony; Shull Testimony; Masters Testimony).

133. The United States Department of the Air Force ("USAF") was "unable to determine" whether its activities in pumping Edwards water would affect the endangered species, and requested the USFWS' assistance in evaluating whether its pumping would affect the species. (Plaintiffs' Summary Judgment Exhibit 46). The USFWS responded to the request by stating "specific studies relating to water withdrawal input on listed species are not readily available." (PX-98).

134. In order to develop an adequate State plan, the TWC, City of San Antonio, and the Texas Legislature need to know the minimum continuous springflows required for compliance with the ESA. (Hall Testimony; Masters Testimony; Aceves Testimony; PX-34).

Consultation

135. One of the tools available to the USFWS for protection of endangered species is consultation under § 7 of the ESA. (PX-36 at p. 95).

136. The San Marcos Recovery Plan called for "vigorous pursuit" of a "systematic procedure" of such consultations. (PX-36 at pp. 76-77).

137. Consultation is potentially a powerful, albeit disruptive, tool because it can result in a Court order cutting off all Federal funds and other Federal actions that directly or indirectly authorize, fund, or otherwise carry out pumping from the Edwards to the extent necessary to prevent jeopardy. (Spear Testimony; PX-85; PX-113; PX-68).

138. After adopting the San Marcos Recovery Plan, the Federal Defendants did not vigorously pursue any systematic procedure of consultations concerning minimum springflow quantities. (Admission 26(f)). Until February 21, 1992, the Federal Defendants did not request consultation concerning any Federal activity by any Federal agency that may affect minimum springflow quantities through effects on withdrawals from the Edwards. (Admission 27(g)).

139. In a letter dated February 21, 1992, the USFWS informed the United States Environmental Protection Agency ("EPA") that the new demand placed on the Edwards by the catfish farm artesian well -- a well that shoots a column of water over twenty-five feet in the air from a thirty-inch diameter pipe (PX-27) -- could appreciably reduce the water supply for the endangered

species at issue during low flow periods. (PX-37). The USFWS requested the EPA determine whether granting an application for a National Pollution Discharge Elimination System ("NPDES") permit for the catfish farm well, which would allow the catfish farm to withdraw over 43 million gallons of Edwards water per day, would affect the Fountain Darter and the Texas Wild-rice. (*Id.*). The USFWS also requested the EPA to review all other NPDES permits authorizing discharges from "major users" of Edwards water -- those discharging more than 1 million gallons per day. (*Id.*).

Establish Groundwater Controls

140. The species in question are threatened with possible extinction, unless effective controls are objectively established on withdrawals from the Edwards. (Spear Testimony). At a minimum, the objective requires pumping controls to "avoid jeopardy to the species by maintaining an aquifer level which assures a minimum spring flow at Comal Springs." (PX-34 at p. 3).

141. The San Marcos Recovery Plan called for establishing pumping controls, recognizing the plan would require cooperation with State and local authorities. (Ex. 36).

142. Not until after the first notice of intent to sue was filed in this case did the USFWS take any step to encourage any State or local agency to establish controls on the pumping of groundwater from the Edwards. (Admission 26(f)). In response to this lawsuit, the USFWS made certain limited efforts to encourage the State of Texas to establish groundwater pumping controls over the Edwards. (Shull Testimony; PX-34 at p. 1). These efforts consisted largely of jawboning, without specifics. (PX-35; PX-94; PX-101; PX-107; PX-113; PX-117; PX-126).

143. This instant lawsuit was a "key factor" in the emergency action taken and proposed permanent rules announced by the TWC on 4/15/92 to regulate withdrawals from the Edwards. (PX-184 at pp. 2-3).

Contingency Plan

144. The San Marcos Recovery Plan called for development of a contingency plan to rescue members of the endangered species and put them in refugia (aquariums) if springflows drop to low levels. (PX-36 at p. 72). While the refugia method is advocated as a viable recovery method, refugia is not a recovery measure but an emergency tool to be used in dire

emergencies if recovery measures cannot be completed in time. *Id.* (Spear Testimony; Shull Testimony; PX-119; Admission 39).

145. The Federal Defendants did not begin to prepare a contingency plan until after the Comal Springs was on the brink of drying up. (Admissions 34, 35). Federal Defendants did not complete and approve the plan until July 18, 1990, when the Comal Springs nearly dried up again. (Admission 37; PX-83; PX-115; PX-119).

146. The contingency plan was prepared using the voluntary, unpaid assistance of experts who are not employees of the USFWS. (Admission 38).

147. The contingency plan identifies, using the USFWS' best professional judgment, critical aquifer levels and springflow rates at which members of the listed species should be removed to refugia. (Shull Testimony; Whiteside Testimony; Moss Testimony; PX-119). The contingency plan was developed without any prior multi-year Instream Flow Incremental Methodology ("IFIM") or other complex studies. (Shull Testimony; Whiteside Testimony).

148. The contingency plan was relied on to establish critical levels at which "last-ditch" efforts were made to "salvage" Fountain Darters at Comal Springs in the summer of 1990.

(Shull Testimony; Whiteside Testimony; Brandt Testimony; PX-119).

Springflow Augmentation

149. The San Marcos Recovery Plan provides, "wells to maintain the natural flow variation regimens below Spring Lake can be a temporary means to achieve continual flow in the San Marcos River." (PX-36). The San Marcos Recovery Plan recognizes that springflow augmentation cannot protect against a "catastrophic loss" of the San Marcos Salamander which lives in the spring openings and that augmentation "will not constitute a recovery action." (PX-36 at p. 74).

150. The TDWR, predecessor of the TWC, evaluated streamflow augmentation in 1983 at the request of the EUWD, which was participating in the development of the San Marcos Recovery Plan. The TDWR advised the EUWD of the substantial risk that movement of "bad water" would "seriously degrade" both the species' habitat and human water supplies if the Edwards were pumped down as proposed. (PX-75).

151. The Federal Defendants, the EUWD, TPWD, the Southwest Texas State University Aquatic Station, the City of New Braunfels, the City of San Marcos, the Edwards Research and Data Center and the Office of State Senator Cyndi Krier at meeting in 1990

concluded: it is "not possible to design an augmentation feasibility study at this time because of the paucity of relevant ecological and physiological data on the endangered species." (PX-132 at p. 3 of the 3/19/91 letter from EUWD to City of San Antonio). The required factual information "is prohibitively deficient." (*Id.*). "Further," the EUWD stated, "the study design team could not conceive of a practical means for simulating natural springflow." (*Id.*). Because "the San Marcos Salamander makes its home in the numerous spring orifices collectively called the Comal and San Marcos springs," the meeting concluded that "[s]imply pumping water from Edwards Aquifer wells into Comal and San Marcos rivers is not a solution." (*Id.*).

152. In the March 26, 1992 USFWS letter to the TWC, the USFWS stated the following about "springflow augmentation":

> Spring flow augmentation studies are not likely to represent a productive use of time and resources. From an endangered species point of view, the Service suggests such proposals be considered extremely unlikely to produce acceptable conditions for endangered species. Even worse, *they divert attention and resources from the hard choices that must be made.*

(PX-34 at p. 3) (emphasis added).

153. In the comments attached to the March 26, 1992 USFWS letter to

the TWC, USFWS stated the following about "springflow augmentation":

> Based upon current information, we do not believe that spring flow augmentation is likely to be an acceptable means of ensuring protection of endangered species and their ecosystems in Comal or San Marcos Springs. We are not aware of any evidence that flow augmentation is technically feasible or that it would provide for the biological needs of the species. To make such a determination with a sufficient degree of certainty would require the springs to first dry up. Allowing the springs to cease flowing for any period of time, even under drought conditions, would pose an unacceptable risk to the continued existence of the listed species, contrary to the ESA.
>
> In addition, it is our understanding that augmenting at Comal Springs would draw the aquifer level down faster at San Marcos. Augmentation at San Marcos Springs cannot be done in a way that would ensure protection of the San Marcos Salamander.
>
> The Service is also concerned about intrusion of bad water at both Comal and San Marcos Springs as aquifer levels decrease. Both springs are very close to the "bad water" line.
>
> We believe springflow augmentation studies *would divert attention and resources from the hard choices that must be made.*

(Comments attached to PX-34 at pp. 5-6.) (underline in original, but emphasis added).

154. Springflow augmentation is not likely to be an acceptable means of ensuring protection of endangered species. (Shull Testimony; PX-34). The USFWS is not aware of evidence

establishing springflow augmentation is either technically feasible or provides for the biological needs of the species. (Spear Testimony; PX-34). To make such a determination with a sufficient degree of certainty would require the springs to first dry up, which would pose an unacceptable risk to the continued existence of the species. (PX-34, comments at pp. 5-6). Springflow augmentation "cannot be done in a way that would ensure protection of the San Marcos Salamander" or other endangered species that live in the springs themselves. (*Id.*; PX-132). "Both springs are very close to the 'bad water' line," (Thornhill Testimony; PX-34, comments at p. 6; PX-184), and augmentation worsens the risk of "bad water" intrusion. (Thornhill Testimony).

The Federal Defendants Have Unlawfully Refused or Unreasonably Delayed Implementing Recovery Measures to Protect Minimum Springflow Quantities

155. As the San Marcos Recovery Plan was being finalized in 1984, the Comal Springs nearly dried up. (Thornhill Testimony).

156. When Regional Director Spear sent the San Marcos Recovery Plan to Washington, D.C. for top-level USFWS approval in 1985, he stated the USFWS' major recommendations, including achievement

of pumping controls, would be "quite difficult" and "controversial." (PX-55).

157. The USFWS did not convene a meeting of the San Marcos Recovery Team between July 20, 1984 and March 29, 1989. (Admission 14).

158. USFWS biologist Tom Brandt worked in 1986-1988 on keeping Fountain Darters in refugia. This study was not aimed at establishing minimum continuous flow requirements. Dr. Brandt performed this study because he, his superiors at the National Fish Hatchery in San Marcos, and their superiors at the Region 2 office of the USFWS in Albuquerque, New Mexico knew there were going to be problems with the Fountain Darter in the future, due to pumpage of Edwards groundwater and lack of rainfall. (PX-244).

159. In March 1989, Professor Whiteside warned the USFWS about the potentiality the "Comal might go dry again this summer." (PX-42).

160. In the summer of 1989, Alisa Shull, the USFWS scientist in charge of the San Marcos Recovery Plan, recommended the USFWS send letters to Federal agencies requesting consultation on measures to reduce the threat to the springs posed by Edwards withdrawals and to pumpers, warning them of the potential for takes if pumping is not reduced. (Shull Testimony; Spear

Testimony). The letters were drafted. (PX-61; PX-62; PX-63). Mr. Spear and the Federal Defendants at the Washington level decided not to use the "blunt axe" of Federal intervention but *to request the State to establish pumping controls "quickly" on a voluntary basis*. (Spear Testimony). Three years later, the State has *still* not *established meaningful pumping controls*. (Spear Testimony; Shull Testimony).

161. Defining minimum springflows is a matter that is "long overdue." (Spear; Hubbs Testimony). Even the USFWS now agrees, if Texas does not establish adequate pumping controls in the next regular session of the Texas Legislature, which began in January of 1993, the "blunt axe" must fall. (*Id.*).

162. Those who withdraw water from the Edwards need to know the minimum springflows at the Comal Springs below which takings begin to occur, so they can restrict withdrawals to the extent necessary to avoid any takings, and so they can seek an incidental take permit to authorize such takings. (Spear Testimony; Shull Testimony; Masters Testimony; Hall Testimony).

163. To date, the Federal Defendants have failed or refused to determine the minimum springflow at the Comal Springs below which takes in violation of ESA § 9 begin to occur.

164. The Federal Defendants were formally advised of takes of Fountain Darters at Comal Springs by Plaintiff-Intervenor GBRA's first Notice of Violations dated June 15, 1989, and they were further advised of their failures to develop and implement recovery plans to prevent takes of and jeopardy to the listed species by the subsequent Notices of Violations by Plaintiff-Intervenor GBRA and the Sierra Club, dated February 17, 1990 and April 12, 1990, respectively (DX-31; DX-32; DX-33).

165. Unauthorized takings of Fountain Darters at the Comal Springs occurred in the summer of 1990, after the Federal Defendants received all of the Notices of Violation.

166. EUWD argues the USFWS does not have the resources necessary to enforce the San Marcos Recovery Plan, to implement and enforce recovery plant of the Texas Wild-rice and the San Marcos Salamander, and to implement and enforce a recovery plan for the Fountain Darter at Comal Springs. However, lack of funding does not excuse the Federal Defendants' failures or refusals to implement key provisions of the San Marcos Recovery Plan responsive to the most serious threat, overdrafting of the Edwards. The key measures require little cash outlays by the USFWS. Federal Defendants can use existing USFWS and National Fish Hatchery employees. The

measures can be done by competent, willing volunteers paid by others (for example, the TPWD), and working out of dedication to the species (for example, the San Marcos Recovery Team members who prepared the contingency plan). (Spear Testimony).

167. The Federal Defendants failed to take timely action to implement key steps in the San Marcos Recovery Plan, critical to the survival of the species, including: define minimum continuous springflows, encourage establishment of pumping controls, prepare the contingency plan, and vigorously pursue a systematic procedure of consultation.

168. The Court does not conclude the Federal Defendants must, without exception, immediately implement every step in every recovery plan. The Court concludes, however, the Federal Defendants may not arbitrarily, for no reason or for inadequate or improper reasons, choose to remain idle. Inaction eviscerates the recovery planning provisions of the ESA and amounts to an abdication of the Federal Defendants' statutory responsibility to plan for the survival and recovery, not the extinction, of endangered and threatened species.

Danny McFadin, et al. Cross-Claim

169. Under § 4 of the ESA, the Federal Defendants may procure the services of appropriate public and private entities to assist in recovery planning. U.S.C. § 1533(f)(2).

170. The San Marcos Recovery Team members, like the members of other recovery teams, were chosen by the USFWS for their expertise and interest in the relevant species and ecosystems. (Spear Testimony; Admission 12).

171. The San Marcos Recovery Team members are volunteers who are reimbursed for travel and meal expenses, but not otherwise paid by USFWS for their work on the San Marcos Recovery Plan. (Spear Testimony; Shull Testimony; Admission 13).

172. Ms. Power was paid $2,000 by the Plaintiff-Intervenor GBRA for field work on transects of the San Marcos River where Texas Wild-rice stands occur. (Power Testimony). The Court is of the opinion there is no evidence the payments affected Ms. Power's professional judgment.

173. The USFWS asked Ms. Power to become a member of the recovery team in the spring of 1992 with knowledge she was already serving as a consultant to Plaintiff-Intervenor GBRA. (Shull Testimony; Power Testimony).

174. Recovery team members' views of what should be done to secure the survival and recovery of endangered species are not

binding on the USFWS, and USFWS' views of what should be done are not binding on recovery team members. Strong disagreements between recovery team members and USFWS are not unprecedented or improper. (Spear Testimony).

175. The USFWS investigated Danny McFadin et al.'s claim regarding the disqualification of certain San Marcos Recovery Team members from working as team members because they served as either consulting experts or, in the case of Ms. Power and Professor Whiteside, testifying experts for the Plaintiff-Intervenor GBRA. The USFWS concluded the disqualification of these San Marcos Recovery Team members is unnecessary and inappropriate. (Spear Testimony).

176. The USFWS determination to continue to use the nonbinding free advisory services of recovery team members, including those who are consultants to or (in the case of the Texas Parks & Wildlife Department) employees of parties to this litigation, is rational.

Standing

177. Plaintiff Sierra Club gave timely and appropriate notice of intent to sue. (DX-33). The suit was duly authorized. (PX-229; PX-243). Plaintiff-Intervenor GBRA gave timely and appropriate notice of intent to sue. (DX-31; DX-32). No

challenge has been made to whether the GBRA's decision to sue was duly authorized. Plaintiff-Intervenor GBRA is a political subdivision of the State of Texas empowered and charged by the State to conserve the waters of the Guadalupe River Basin for protection of water supplies, protection of water quality, and all other useful purposes. (Specht Testimony). The waters of the Comal and San Marcos Springs are waters of the Guadalupe Basin. (Thornhill Testimony; Specht Testimony). The survival and recovery of wild populations of endangered and threatened species is a useful purpose under the ESA. The same minimum springflows, essential to the survival of the endangered and threatened species, make up 30% of the normal base flow of the Guadalupe and more than 70% of its flow during drought; therefore, it is important for Plaintiff-Intervenor GBRA to conserve and protect minimum springflows for protection of water supplies, protection of water quality, as well as for protection of endangered species. (Specht Testimony; Thornhill Testimony).

178. The Defendants and Defendant-Intervenors argue Plaintiffs did not inform the Secretary or the USFWS of the contention the USFWS violated § 9 by taking listed species. (Fed. Def. Br. at pp. 5-6). This assertion rests on a hypertechnical reading of the GBRA and Sierra Club notices. Both the Sierra Club and

GBRA gave notice of violations "of the [S] 9 prohibitions against the taking of any listed wildlife species" and "of the [S] 9 prohibition against removal, damage, or destruction of any listed endangered species of plant." (*See* GBRA's Notice at 13). While Plaintiff and Plaintiff-Intervenors concede these complaints were specifically directed at "Upstream Diverters" (those people withdrawing waters from the Edwards and upstream from the Edwards), these notices were sent to the Secretary in part in order to give him a chance to develop and implement a plan and to take whatever actions are necessary against these Upstream Diverters. Moreover, the USFWS was listed as an Upstream Diverter, so it received direct notice it could be sued under § 9 of the ESA. (GBRA's Notice DX-B at p. 29). The purpose of the notice provisions is "to give administrative agencies an opportunity to enforce environmental regulations." *Hallstrom v. Tillamook County*, 110 S.Ct. 304, 308 (1989) (dealing with notice provision of Resource Conservation and Recovery Act ("RCRA"), but Supreme Court noted ESA notice provision and RCRA notice provision were patterned after the same notice provision).

179. Thus, Plaintiff and GBRA gave notice of § 9 takings due to excessive withdrawals from the Edwards, and gave notice that the Federal Defendants had failed to prevent excessive

withdrawals by failing to perform their non-discretionary duties under the ESA. After receiving that notice, the Federal Defendants still did nothing. Their failure to perform their non-discretionary duties after receipt of the notice, all by itself, constitutes § 9 violations. If a plaintiffs was required, before filing suit, to give the Secretary an additional notice each time the Secretary failed in his duties to respond to a previous notice, no lawsuit could ever be brought.

180. Defendants argument that some of the Plaintiff-Intervenors in the case are not proper parties because they did not give their own notices under the ESA is without merit. (*See* Fed. Def. Br. at pp. 5-6; Def. Int. Br. at p. 29). The purposes of the notice provision were served by the GBRA and Sierra Club notices: to call the violations of the ESA to the attention of the Federal Defendants and to give the Federal Defendants 60 days to remedy the violation.

181. Individual Sierra Club members live in Austin, San Antonio, San Marcos, or New Braunfels. They have visited the springs many times to enjoy the ecosystems and the species, intend to continue doing so, and can readily do so if the springs are not allowed to dry up or species are not extirpated. (Kramer Testimony). Sierra Club member Dr. Clark Hubbs, University of

Texas Professor Emeritus of Biology, lives in Austin. He has visited the springs for these purposes as recently as September 1992. (Hubbs Testimony). The Lone Star Chapter of the Sierra Club organized group trips to the springs for similar purposes, intends to continue to do so, and can readily do so if the springs are not allowed to dry up or species are not extirpated. (Kramer Testimony).

182. The economies of Plaintiff-Intervenor the City of San Marcos and Plaintiff-Intervenor the City of New Braunfels are directly and significantly dependent on tourism and research associated with the springs and with the endangered and threatened species who live in those ecosystems. (PX-220; PX-223). The cities foster and encourage studies of the San Marcos and Comal ecosystems, including the endangered species, by professionals, students, and interested lay persons.

183. The Federal Defendants's violations of § 4 deprived the Plaintiff and Plaintiff-Intervenors, Defendant-Intervenors, *amici*, and non-parties of information essential to the protection of the spring-runs, Aquifer levels, and associated species; that is, the minimum quantities of springflows and Aquifer levels which the ESA requires be protected. (Spear Testimony; Specht Testimony; Masters Testimony; Aceves Testimony; Hall Testimony; Hubbs Testimony). The information

is essential to the efforts of Federal (USAF), State (TWC), regional (EUWD), and local (San Antonio) entities to devise an adequate plan or plans to regulate pumping and otherwise protect both the endangered and threatened species and the human economic interests threatened by excessive pumping.

184. Both the USFWS and the TWC concede this instant lawsuit prompted long-overdue efforts to determine and to protect minimum springflows for those spring-dependent species. The Federal Defendants' violations of § 4 of the ESA hindered and delayed efforts to develop and to implement measures to determine and protect minimum continuous springflows. The Federal Defendants thereby caused or allowed takings of the endangered species in question. Further the Federal Defendants significantly increased the risk of jeopardy to the continued existence of the endangered species in question.

Avoiding or Minimizing Harm

185. Mr. Spear would be "delighted" if the Court were to encourage the Texas legislature and affected parties to solve the Edwards problem by ordering the USFWS to state minimum continuous springflows promptly, and communicate them to all concerned. (Spear Testimony).

186. In wading through the turbid pool of information and alleged negotiations generated by the instant case, no harm to USFWS would result from an order requiring the USFWS to use its best professional judgment to determine minimum continuous springflows within forty-five (45) days. (Spear Testimony). The USFWS would remain free to conduct, or to request others to conduct, such scientific studies as it wishes, on such schedules as it wishes, and to modify its judgments if, as, and when those studies generate different and better information. Indeed, under 50 C.F.R. § 402.16(b) and *Sierra Club v. Yeutter*, 926 F.2d 429 (5th Cir. 1991), the USFWS would be obligated to update its judgments when necessary, in light of subsequent materially different information.

187. No harm to anyone else, and much benefit, would flow from an order requiring the USFWS to make prompt best professional judgments of minimum springflow and Aquifer levels and communicate them to all entities concerned with Edwards issues. The Texas Legislature, the TWC, the EUWD, and the City of San Antonio would benefit by knowing the minimum springflows that an adequate State plan must protect if it is to avoid the "blunt axe" of Federal intervention pursuant to the ESA. (Spear Testimony; Shull Testimony; Aceves Testimony; Masters Testimony; Hall Testimony; Specht Testimony).

188. The economic consequences feared by Defendant-Intervenors the City of San Antonio, the Industrial Water Users, and the Builders Association will not result from USFWS compliance with this Court's order requiring prompt determinations of the minimum springflows to be protected under the ESA. (Aceves Testimony, Perryman Testimony).

189. If such economic consequences ever result at all, it will be due to failure of State and local authorities and regional water users to take prompt and appropriate actions to develop pumping controls and reduce dependence on the Edwards before the "blunt axes" of Federal intervention under ESA §§ 7 and 9 fall. These actions are independently required by the threat of bad water movement and because the Edwards is badly overdrafted, as well as by the threat of Federal intervention under §§ 7 and 9. (Spear Testimony; Aceves Testimony; Masters Testimony; Hall Testimony; Perryman Testimony).

190. The ESA provides mechanisms to allow the State of Texas substantial time to reduce withdrawals from the Edwards in an orderly and nondisruptive manner. One of those mechanisms is a § 10(a) incidental take permit. The Federal Defendants are willing to grant the State a § 10(a) permit if, but only if, an adequate State plan for pumping controls is adopted and its implementation reasonably assured. (Spear Testimony; PX-34;

P-35). *The sooner Texas adopts an adequate plan and obtains a § 10(a) permit, the better.* (Spear Testimony; Shull Testimony; Aceves Testimony; Masters Testimony; Hall Testimony).

191. The serious water supply problem associated with rapid increases in population and municipal, industrial, and agricultural water demand and exclusive dependence on the Edwards by the City of San Antonio has been recognized for over thirty-five years. *See Board of Water Engineers v. City of San Antonio*, 283 S.W.2d 722, 723 (Tex. 1955).

192. The City of San Antonio is blessed with a rare source of water. Unfortunately, the Edwards is currently the City of San Antonio's "sole source" of water because the City of San Antonio failed to develop adequate water supplies from other sources to reduce their reliance of the Edwards.

193. The relatively brief and mild drought of 1984 and associated pumping posed a serious threat to the San Antonio region's water supplies. (DX-112 at p. 1). In response, San Antonio and the EUWD sponsored a 1986 multi-volume *San Antonio Regional Water Resources Study*. (DX-169). For water supply and economic development purposes, as well as to protect the endangered species dependent on springflow, the study shows alternative water supplies using a combination of surface

water and wastewater reuse is required. The costs are feasible. (*Id.* at pp. 1-13). Assuming the worst case, "San Antonio would go from being a low-water cost city to a moderate-cost city." (*Id.* at p. 13).

194. Almost four decades of negotiations among the affected parties have failed to yield a resolution of the disputes regarding the proper management of the Edwards. (Specht Testimony; PX-190 at p. 4). *Continuing failure risks Federal intervention to protect endangered species.* (PX-190 at pp. 4-5). The danger is adequately understated as imminent. (Spear Testimony).

195. The negotiations failed in significant part because those who benefit by unregulated pumping do not believe pumping will be limited to protect endangered species, do not understand what limits are required, or because it is not politically feasible for them to agree to the limits required, absent a Court order. (Spear Testimony; Specht Testimony; Hall Testimony; Aceves Testimony; Masters Testimony; PX-134).

196. *The next session of the Texas legislature offers the last chance for adoption of an adequate state plan before the "blunt axes" of Federal intervention have to be dropped.* (Spear Testimony). There is a debate about the adequacy of the TWC State plan to protect minimum continuous natural

springflows and Aquifer levels, which cannot be resolved until the USFWS determines the take and jeopardy levels required to be protected under the ESA. (Thornhill Testimony; Spear Testimony; Specht Testimony; Hall Testimony; Aceves Testimony; Masters Testimony).

197. In order to obtain injunctive relief under the ESA, "the Plaintiffs must establish four facts: (1) actual success on the merits, (2) a substantial threat of irreparable harm absent an injunction, (3) that the irreparable harm threatened is greater than that caused by the injunction, and (4) the public interest would be served by the injunction." *Sierra Club v. Lyng*, 694 F. Supp. 1260, 1277 (E.D. Tex. 1988) (citing *Tubwell v. Griffith*, 742 F.2d 250, 251 (5th Cir. 1984)). Defendants contend Plaintiffs failed to demonstrate a real and immediate threat of irreparable harm to any of the species at issue is the case *sub judice*.

198. In light of all the findings and contrary to Defendants' assertions, irreparable harm to endangered and threatened species, and to human interests dependent on Edwards and Comal and San Marcos Springs, is likely to occur if the USFWS does not promptly determine and communicate the minimum springflows and Aquifer levels required to be protected under the ESA.

199. Continuous springflows from the Comal Springs can be maintained at all times during a repeat of the drought of the 1950's if pumping were limited to something slightly less than approximately 219,000 acre-feet per year during the 1950's drought. Limiting pumping to an average of roughly 200,000 acre-feet per year during the drought would provide some minimal continuous daily Comal springflows. (Thornhill Testimony).

200. Even if the needs of endangered species were disregarded entirely, there is a water-quality floor below which the level of water in the Edwards should not be allowed to drop, solely for water supply purposes. (Thornhill Testimony; Aceves Testimony; Hall Testimony; Masters Testimony). The water-quality floor should be defined in part based on known water quality impacts in the Aquifer itself caused by pumping-induced drawdowns and springflow depletion. The water-quality floor should be set high enough to avoid any appreciable risk of significant water-quality harm, taking into account the unknowns and the potential serious consequences accompanying the unknowns. (Thornhill Testimony).

201. The surest and most prudent method of ensuring there will be no significant adverse water quality impact due to pumping from the Edwards is to limit pumping to the extent necessary

to maintain adequate continuous natural springflows from the Comal Springs at all times. The evidence demands, until reliable information is garnered stating otherwise, the prohibition of any other limitation. (Thornhill Testimony).

202. The "firm yield" of the Edwards, assuming protection of just minimal continuous daily springflows from the Comal Springs, is on the order of roughly 200,000 acre-feet per year during a repeat of the drought of record. (Thornhill Testimony).

203. The "firm yield" of the Edwards is not 350,000 acre-feet per year. Pumping 350,000 acre-feet per year throughout a repeat of the drought of the 1950's will cause the Edwards to drop to levels far below the historic low of 612.51 feet mean sea level, dry up the Comal Springs for years and San Marcos Springs for substantial periods of time, contaminate the Edwards by movement of bad quality water into the fresh water, and risk other environmental harm. (Thornhill Testimony).

204. Withdrawals in excess of 200,000 acre-feet per year can be allowed during normal and wet years; especially in years similar to 1992. However, it would be imprudent to rely upon and plan for the Edwards to supply the region 350,000 acre-feet of water per year during a repeat of the drought of the 1950's. (Thornhill Testimony).

205. If the City of San Antonio would seriously and immediately develop additional supplies of water, implement conservation programs and mandates (like minimal lawn watering and credits for native landscaping), reuse water, and seek alternative sources of water, the City of San Antonio is likely to obtain substantial additional water supplies within five to ten years. (Thornhill Testimony; Specht Testimony).

206. If the region is fortunate enough to miss a major drought within the next five to ten years, the only significant economic impact on San Antonio and the region resulting from satisfying the requirements under the ESA to maintain minimum springflows at the Comal and San Marcos Springs would be the cost of obtaining additional supplies of water within the period of time. (Aceves Testimony; Perryman Testimony).

207. Approximately the same cost would have to be borne by San Antonio and the region, even if the needs of endangered species were disregarded entirely; adequate and continuous natural springflows are needed from the Comal and San Marcos Springs at all times to avoid the risk of significant adverse water quality impacts, solely for water supply purposes. (Aceves Testimony, Perryman Testimony).

208. If the region experiences a major drought within the next five to ten years, and if severe economic harm otherwise results

from satisfying the requirements under the ESA (and to avoid water quality risks for water supply purposes) by maintaining minimum continuous natural springflows at the Comal and San Marcos Springs, exemptions can be sought to allow takings, destruction of critical habitat, jeopardy, and even extinction of species during such a crisis, pursuant to §§ 10(a) and 7(h) of the ESA. 16 U.S.C. §§ 1536(h), 1539(a).

209. Destruction of critical habitat, jeopardy, and extinction of species may also be allowed pursuant to § 7(j) of the ESA if necessary for reasons of national security. 16 U.S.C. § 1536(j).

Timing

210. The Court is satisfied Plaintiffs met their burden proving the necessary facts in order to obtain injunctive relief under the ESA; thus, timing is the remaining issue for discussion. The Edwards can fall from record highs to levels at which Comal Springs is below 100 cfs, takes are occurring, and jeopardy is imminent, in less than two years. (Thornhill Testimony; PX-189, PX-190).

211. The Edwards fell from a then-record high in late 1987 to levels at which Comal Springs nearly dried up in the summer of 1989. (PX-207).

212. The Edwards can even fall to levels at which the Comal Springs are imperiled in less than one year. (Thornhill Testimony; PX-248).

213. The Comal Springs in theory could be in danger of drying up again by the summer of 1993 or by the summer of 1994. (Thornhill Testimony; PX-248).

214. The 1984, 1989, and 1990 droughts were once-a-decade drought events. (Bomar Testimony). The risk of Comal Springs drying up again soon is considerable.

215. Once the Edwards has fallen to levels at which Comal Springs has fallen to 100 cfs, it can fall further to levels at which Comal Springs dries up completely in less than one month. Based on historical experiences in 1956, 1984, 1989, and 1990, the Comal Springs could fall from 100 cfs to 0 cfs in two to three weeks. (Thornhill Testimony).

216. The Federal Defendants' current Flow and Habitat Requirements study addresses only the minimum Comal flow requirements of the Fountain Darter and an invertebrate proposed for listing. (DX-63). It does not address the minimum flow or Aquifer level requirements of any of the other species at issue. (Shull Testimony). This study will take more than one year to complete, and Ms. Shull believes it cannot be completed until Comal Springs have once more dropped to low levels. (*Id.*).

She does not know how low Comal Springs must drop for purposes of this study. (*Id.*).

217. If the USFWS is allowed to wait until Comal Springs again falls below 100 cfs before determining and communicating the real jeopardy level, above 0 cfs, takes of the Fountain Darter will certainly occur and it is very likely Federal or Court intervention will be too late to save the endangered species from jeopardy through the drying up of Comal Springs.

218. The USFWS can and does determine minimum springflows required for protection of endangered species using best professional judgment, without waiting on the results of multi-year scientific studies. The USFWS did so in 1990 when it adopted the contingency plan and critical Aquifer and springflow levels at which it would authorize last-ditch removal of endangered species. (PX-119). The USFWS did so again on March 26, 1992, when it advised the TWC of Comal springflow levels below which takes of and jeopardy to the Fountain Darter have already occurred. (PX-34).

219. The Court considers it is feasible for the USFWS to use its best professional judgment to determine, within forty-five (45) days, the minimum Comal and San Marcos springflow levels at which takes of and jeopardy to the Fountain Darter first began to occur, and at which damage to or destruction of or

adverse modification of the critical habitat of the Texas wildlife begin to occur. (Whiteside Testimony; Moss Testimony; Hubbs Testimony; Power Testimony; Thornhill Testimony).

IN ACCORDANCE WITH the foregoing Findings of Fact and Conclusions of Law, the Court will enter its Judgment in the above-captioned cause in favor of Plaintiff and Plaintiff-Intervenors.

SIGNED this 30th day of January, 1993.

Lucius D. Bunton

HONORABLE LUCIUS D. BUNTON, III
SENIOR DISTRICT JUDGE

STATEMENT FOR THE RECORD
OF
RONALD H. BROWN
SECRETARY OF COMMERCE

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES
COMMITTEE ON MERCHANT MARINE AND FISHERIES
U.S. HOUSE OF REPRESENTATIVES

APRIL 1, 1993

Mr. Chairman and Members of the Subcommittee:

I appreciate this opportunity to present the Department's efforts to conserve marine biodiversity.

The Earth is experiencing an unprecedented loss of its biological wealth, measured by extinction of species and degradation of ecological systems. In both the scientific literature and media, the decline of better known and observed terrestrial species and ecosystems has overshadowed the decline of lesser known groups of marine plants, fish, and invertebrates. The problem of overuse of resources and degradation of habitat are also severe in the marine environment. As we increase our use of ocean and coastal resources, human-related activities seriously threaten the variety and variability of species, gene pools, and ecosystems in the world's oceans and estuaries.

When we speak of marine biodiversity we refer to the variability needed for ecosystems to respond to natural and human-caused changes. Species extinction weakens an ecosystem by decreasing that system's ability to function properly; similarly, losing or fragmenting populations of species weakens the genetic fitness of the species. On a larger scale, when whole ecosystems are degraded, the ecological processes and ecosystem services are weakened. The intrinsic and aesthetic values of marine biodiversity are immeasurable, but the losses of species and ecosystems are reflected in the losses of their services to humanity: as sources of food, energy and raw materials, pollutant sinks, and pharmaceuticals. Although in most cases we are unable to quantify them, these losses have economic impacts.

The Department is aware of the numerous and serious threats to marine biodiversity and ecosystems. These threats include pollution, habitat destruction, introduction of non-indigenous species, and overharvest and indiscriminate harvest of marine species. These human-induced changes to natural ecosystems are significantly different than those caused by natural perturbations, mainly because of the intensity and rate of change. When these activities stress marine ecosystems, we invite genetic, species, and ecosystem collapse.

The largest agency within the Department of Commerce, the National Oceanic and Atmospheric Administration (NOAA), is fully committed not only to the conservation of marine and anadromous species that are endangered or threatened with extinction, but also the conservation of all marine wildlife and the ecosystems on which they depend. To meet the goals of NOAA's various resource conservation and management mandates, and address the issue of marine biodiversity, NOAA is developing a marine biodiversity action plan. As the Federal ocean science agency, NOAA is uniquely qualified to approach the issue of marine biodiversity in a comprehensive manner, applying its diverse capabilities in remote sensing; analysis of biological, chemical, and physical processes; prediction and forecasting abilities; and resource protection and management.

NOAA intends to provide national leadership by defining a marine biodiversity agenda that incorporates and broadens its existing resource conservation and management programs. This plan will focus on NOAA's authorities under the Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), Magnuson Fishery Conservation and Management Act (Magnuson Act), Marine Protection, Research and Sanctuaries Act (MPRSA), and the Coastal Zone Management Act (CZMA), among others.

The next portion of my statement provides examples of the Department's actions to reverse species decline and descriptions of our other resource conservation and management programs related to marine biodiversity conservation.

Endangered and Threatened Species Management

Under the ESA, NOAA's National Marine Fisheries Service (NMFS) is responsible for monitoring and protecting marine life considered to be at risk of extinction. The ESA requires that NMFS use all reasonable methods available to conserve endangered or threatened species and their habitats. NMFS maintains a comprehensive program which addresses these needs for marine and anadromous species.

Anadromous fish play a critical role in the Nation's economy. NMFS is addressing the potential extinction of several "runs" of various species of salmon on the west coast. Although no salmon species is threatened with extinction overall, some runs of certain species are threatened. Each run has genes uniquely adapted to its natural environment. The continued loss of this genetic material diminishes the species' overall ability to accommodate long-term natural and human-related changes in the environment.

In the face of diverted river water and a lengthy drought, the population of Sacramento River winter-run chinook salmon plummeted 90 percent in one generation. Because cold water spawning areas are cut off by dams, these salmon must spawn in areas downstream that are often too warm for successful reproduction. The few salmon that do hatch face numerous artificial obstacles such as dams without adequate passage facilities. The decline of salmon is a symptom of a larger issue: the diversion of 80 percent of the Sacramento River's water to agricultural and municipal contractors. Through the ESA, NMFS is lessening the immediate impacts to the salmon, but the larger issue of ecosystem alterations and destruction remains.

In the Snake River, three salmon populations are listed under the ESA. Habitat degradation, hatchery operations, hydroelectric operations, and fishery harvesting practices have all had adverse effects on these listed fish. NMFS is coordinating an ecosystem-based recovery plan for all three populations, but a multi-agency ecosystem-based management plan would have been a better means to protect salmon and minimize the risk of extinction.

Marine species protection issues are often unique in that many marine species are highly migratory, traveling great distances between breeding and foraging habitats. Designating critical habitat for such species is often more difficult and complex than for terrestrial species. For example, all species of sea turtles occurring in U.S. waters are currently listed under the ESA. The major threats to sea turtles are 1) incidental take in commercial fisheries worldwide, 2) exposure of eggs and hatchlings on nesting beaches, 3) loss of nesting beaches to coastal development, 4) ingestion of, and entanglement in marine debris, and 5) commercial trade in turtles and turtle parts. Because a sea turtle may travel widely during its lifetime, NMFS can only safeguard sea turtles by pinpointing and regulating threats, rather than designating its whole range as critical habitat. Through the ESA, NMFS and the U.S. Fish and Wildlife Service are making substantial progress in eliminating the major human causes of turtle mortality noted above.

The ESA can be used in combination with other authorities to protect species. For example, stellar sea lion populations in the Gulf of Alaska have declined by over 60 percent in the past eight years. Through the ESA and Magnuson Act, NMFS has been able to reduce potential conflicts between commercial fisheries and the stellar sea lion by reducing competition for the sea lion's primary food source, pollock. Another major threat to marine mammals is incidental capture by gillnets. The harbor porpoise in the Gulf of Maine is a bycatch of the gillnet fishery. NMFS is concentrating on reducing gillnet bycatch both to reduce overharvesting of fishery resources and to protect the harbor porpoise.

Other Marine Management Programs

The ESA is not the only means to protect marine wildlife and ecosystems. Under the Marine Mammal Protection Act, NMFS is responsible for establishing a program of marine mammal protection and management, maintaining the health and stability of the marine ecosystem, and restoring and maintaining species at optimum sustainable population levels. Through the MMPA, NMFS manages all cetaceans (whales and dolphins) and pinnipeds (seals and sea lions) except walruses.

Similarly, NMFS is directed to manage and conserve U.S. fishery resources under the Magnuson Act. Commercial and recreational fisheries in Federal waters are managed to prevent overfishing and stock depletions, to protect their habitats from further degradation and pollution, to increase domestic harvest, and to maintain optimum yields. As steward of the Nation's living marine resources, NMFS conducts research and conservation programs to enable the Nation to use resources wisely and on a sustainable basis.

While these statutes address species conservation, other NOAA programs conserve ecosystem diversity by protecting marine habitats. The Marine Protection, Research and Sanctuaries Act created the National Marine Sanctuary Program, which explicitly directs NOAA to protect nationally significant marine areas. There are currently 13 National Marine Sanctuaries off the continental U.S. and American Samoa with four more expected to be designated in the near future.

Biodiversity conservation is an implicit goal of the marine sanctuary program and is the focus of its developing research program. Marine sanctuaries harbor an array of plants and animals, from great whales to brightly colored sea snails. In many cases, these protected waters provide secure habitats for species close to extinction.

Another comprehensive tool for protecting biodiversity in nearshore and coastal habitats is the Coastal Zone Management Act. Through the CZMA, the National Estuarine Research Reserve System (NERRS) promotes long-term research, monitoring and maintenance of biogeographically-representative estuaries. One aspect of the 10-year primary research objective of the NERRS involves the study of natural and anthropogenic changes and their effect on the biodiversity of estuaries. There are currently 21 National Estuarine Research Reserves throughout the continental United States and island territories. Major efforts are underway at NOAA to link research and monitoring activities at estuarine research reserves and marine sanctuaries, as well as link these activities with other national and international efforts.

The CZMA also encourages states to develop policies for the protection of natural resources, including wetlands, floodplains, estuaries, beaches, barrier islands, coral reefs, and fish and wildlife habitat within the coastal zone.

The NMFS Habitat Conservation Program protects biodiversity by conserving the habitats and associated biological communities necessary to sustain living marine resources. This is accomplished primarily through the use of authorities contained in the National Environmental Policy Act and the Fish and Wildlife Coordination Act which provide for the review of Federal actions that may affect living marine resources. NMFS comments on proposed projects and may suggest changes or mitigation measures to protect living marine resources. In coordination with the habitat program, the NOAA Restoration Center pursues alternatives to restore living marine resource habitat.

In addition, NOAA's Estuarine and Coastal Assessments Program characterizes the effect of habitat modifications on living marine resources.

NOAA also works closely with EPA to address nonpoint pollution problems in coastal waters pursuant to the CZMA. These efforts to curtail the degradation of coastal waters and habitats support biodiversity conservation activities.

Research and Monitoring Programs

In addition to marine management programs, NOAA also conducts programs to study and monitor marine wildlife and ecosystems. For example, to maintain genetic diversity, NOAA is investigating the effects of stock enhancement and disease prevention of both harvestable and listed species. In order to better understand species diversity, NMFS supports and conducts stock assessments and research on fisheries stocks, marine mammals, and species listed under the ESA.

Taxonomic research is vital to understanding marine biodiversity. The NMFS National Systematics Laboratory describes marine organisms of economic and ecological value to the United States. Marine organisms provide essential natural functions for life on Earth. For instance, these organisms produce vast quantities of oxygen, serve as carbon sinks, and form the basis of the complex marine food web on which marine vertebrates and invertebrates depend. We estimate that there may be as many as one million undescribed species inhabiting the deep sea. With each new discovery and investigation there exists the potential for significant advancement in basic and applied sciences, including food and nutrition, biotechnology, medicines, raw materials, and understanding the global climate.

NOAA is also conducting extensive ecosystem and habitat research through various academic and other programs such as the National Sea Grant College Program, the National Undersea Research Program, and the Coastal Ocean Program. These programs support scientists studying the relationship between physical and chemical variables and productivity of estuarine and coastal ecosystems. NOAA also maintains database and assessment systems which provide basic information on commercial and noncommercial marine wildlife, ocean, estuary and land cover conditions. This information is useful in evaluating species diversity and the effect of land use (based on land cover changes) on such diversity.

Finally, NOAA monitors the effects of ocean dumping and other human-induced changes on ocean ecosystems. For example, NOAA chairs an interagency Aquatic Nuisance Task Force that addresses the effects of introductions of marine species. These introductions carry a risk of moving diseases and pathogens into other areas and infecting native species. Introduced species may also compete with native species and lead to extinction.

All of these research programs provide NOAA and other Federal agencies with a solid base of scientific information used to conserve biodiversity. Such baseline knowledge is essential to wise management and decision making.

Conclusion

Just as there is concern about losing genetic resources through species extinction in terrestrial environments, there is growing concern about loss of genetic resources in marine environments. The inability to protect sensitive ecosystems, both marine and terrestrial, before their dependent species are in jeopardy is a common one. While protecting individual species through the ESA must remain a primary method of maintaining species diversity, a more comprehensive ecosystem approach to biodiversity conservation is needed. It makes little sense to watch the destruction of a species' vital habitat and then list the species under the ESA in order to prevent its extinction. We must carefully evaluate whether current law can preserve our Nation's marine biodiversity and related habitats.

Of particular concern are highly diverse marine environments such as coral reefs. In the Florida Keys and U.S. Caribbean, coral reefs are being destroyed by pollution and coastal development. Coral degradation in turn contributes to the decline of many species, vertebrates and invertebrates. While coral reefs are possibly the most diverse ecosystems, other marine systems such as mangroves, sea grass beds, and kelp forests are just as important to maintaining marine biodiversity.

Biodiversity conservation is limited by the extent of our knowledge about marine ecosystems and species. NOAA will continue to address these needs in the future. Additionally, there is a need to educate scientists and the public about undersea and coastal environments. Without public support, including proper training for taxonomists, biologists, and managers, the conservation of biodiversity cannot be accomplished.

Finally, since marine wildlife and ecosystems cross international boundaries, marine biodiversity is not just a national issue. The United States must stress international cooperation or NOAA's efforts to conserve marine biodiversity could be undone by the actions of other nations.

This concludes my statement.

The Edwards Aquifer

Underground River of Texas

GBRA
GUADALUPE-BLANCO RIVER AUTHORITY

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Bibliography

Biography of the Authors

April 1988

THE EDWARDS AQUIFER - AN UNDERGROUND STREAM

INTRODUCTION

A unique underground conduit that has been termed the Edwards-Balcones Fault Zone Aquifer serves both to gather flow from its tributary streams, largely from the upper portions of the San Antonio and Nueces River Basins, and to transport this water many miles, mainly to two large springs within the watershed of the Guadalupe River. Comal Springs at New Braunfels and San Marcos Springs at San Marcos are the principal surface outlets for this subterranean flow in the Edwards Aquifer. Thereby, the conduit is responsible for a natural interbasin diversion of hundreds of thousands of acre-feet of state water per year to the Guadalupe River.

The spring flow from the Edwards Aquifer is a large part of the flow of the Guadalupe River in normal times and a major portion of its flow during drought. This natural diversion of surface waters from the contributory watershed of the Guadalupe River to its traditional watershed through the underground conduit provides unique aquatic environments at and downstream of the large springs, supports major recreational uses, supplies water needed to honor downstream water rights, maintains water quality, and provides vital inflows to coastal environments.

THE MULTIPLE WATERSHEDS OF THE GUADALUPE RIVER

By Paul D. Thornhill
Espey, Huston & Associates, Inc.

The Guadalupe River Watershed

The Guadalupe River Watershed consists of two component watersheds which are referred to herein as the "contributory watershed" and the "traditional watershed." The following discussion describes these component watersheds and their relationship. Figure 1 shows the Guadalupe River Watershed and its component parts.

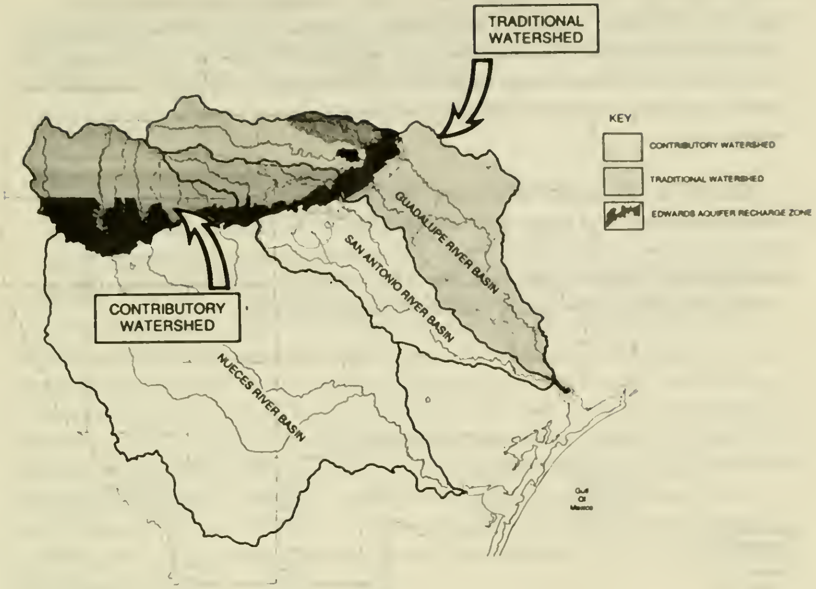
The Contributory Watershed

The contributory watershed of the Guadalupe River consists of numerous surface drainage basins which contribute to the Guadalupe River via the Edwards Aquifer. This area is also sometimes referred to as the catchment area and recharge zone of the Edwards Aquifer.

The contributory watershed consists of approximately 4,647 square miles, composed of approximately 3,546 square miles of non-recharging catchment area and 1,101 square miles of recharge zone. Approximately 1,812 square miles of drainage area upstream and within the recharge zone do not contribute significantly to Edwards Aquifer recharge and are not part of the contributory watershed.

Within the Nueces River Basin boundaries, the contributory watershed contains portions of Edwards, Real, Bandera, Kinney, Uvalde, and Medina counties. Major surface streams which collect surface runoff within this portion of the contributory watershed include the West Nueces River, the Nueces River, the Dry Frio River, the Frio River, the Sabinal River, Seco Creek, and Hondo Creek.

Within the San Antonio River Basin boundaries, the contributory watershed contains portions of Kerr, Bandera, Kendall, Comal, Medina, and Bexar counties. Major surface streams which collect surface runoff within this portion of the contibutory watershed include the Medina River, Helotes Creek, Salado Creek, and Cibolo Creek.



THE GUADALUPE RIVER WATERSHED

(FIGURE 1)

Within the Guadalupe River Basin boundaries, the contributory watershed contains portions of Blanco, Hays, and Comal counties. Major surface streams which collect surface water runoff within this portion of the contributory watershed include Dry Comal Creek and the Blanco River. The main stem of the Guadalupe River itself contributes little recharge; therefore the contributory watershed does not include the Guadalupe River surface drainage upstream of the point where the Guadalupe River crosses the southern boundary of the recharge zone.

Table 1 provides a summary of the recharge of water to the Edwards Aquifer which occurs from the contributory watershed. Total average annual recharge to the Edwards Aquifer has historically averaged 604,600 acre-feet per year (1934-1985). Of this, 342,100 acre-feet per year (or 56.6 percent) is from the Nueces River Basin, 205,300 acre-feet per year (or 34.0 percent) is from the San Antonio River Basin, and 57,200 acre-feet per year (or 9.4 percent) is from the Guadalupe River Basin.

TABLE 1

CONTRIBUTORY WATERSHED

	Drainage Area Upstream of the Recharge Zone[1] (sq mi)	Drainage Area within the Recharge Zone[1] (sq mi)	Total Drainage Area [1] (sq mi)	Average[2] Annual Recharge (1934-85) (ac-ft/yr)	Recharge Extremes[2] (ac-ft/yr) High		Low	
Nueces River Basin								
Nueces/West Nueces River	1,233	481	1,714	100,800				
Interfluve Nueces/Dry Frio	0	100	100	Insig	411,300	(1935)	6,600	(1934)
Frio/Dry Frio Rivers	443	168	611	110,400				
Interfluve Frio/Sabinal	0	53	53	Insig	365,200	(1981)	4,200	(1956)
Sabinal River	215	6	221	37,800				
Interfluve Sabinal/Medina	253	180	433	92,800	223,800	(1958)	600	(1955)
Subtotal	2,144	988	3,132	342,100	294,800	(1958)	3,600	(1956)
San Antonio River Basin								
Medina River	631	27	658	60,000				
Interfluve Medina/Cibolo	147	129	276	65,000	104,000	(1980)	6,300	(1956)
Cibolo Creek	245	21	266	80,300[3]	237,200	(1973)	2,000	(1956)
Subtotal	1,023	177	1,200	205,300	316,900	(1957)[3]	1,800	(1956)[3]
Guadalupe River Basin								
Dry Comal Creek	7	61	68	20,500[3]				
Guadalupe River	1,482	177	1,659	Insig	61,000	(1957)[3]	400	(1956)[3]
Blanco River	372	28	400	36,700				
Subtotal	1,861	266	2,127	57,200	85,800	(1975)	8,200	(1956)
Total	5,028	1,431	6,459	604,600				
TOTAL CONTRIBUTORY WATERSHED[4]	3,546[4]	1,101[4]	4,647[4]	604,600				

1/ Planimetered from USGS 1:250,000 topographic maps.
2/ Ozuna, et al, 1987 Edwards Underground Water District, Bulletin 45.
3/ Total average annual recharge for Cibol/Dry Comal Creek Basin split by drainage area ratio.
4/ Excludes drainage areas which do not contribute to Edwards Aquifer recharge.

Insig = "Insignificant"

The range of recharge is dramatic. The higher annual range of recharge varies from 200 percent to 700 percent of the average annual values, while the lower annual range of recharge is less than 11 percent (averaging 6.5 percent) of the average annual recharge values.

The Traditional Watershed

The traditional watershed of the Guadalupe River consists of the entire surface drainage basin within the topographic confines of the Guadalupe River Basin.

The total drainage area of the Guadalupe River at its confluence with the San Antonio River is 5,963 square miles (EH&A, 1986). Of this, 2,127 square miles are upstream of the southern boundary of the recharge zone of the Edwards Aquifer, and 3,836 square miles are below the southern boundary of the recharge zone. Of the 2,127 square miles upstream of the southern boundary of the recharge zone, 1,659 square miles are non-contributing to the recharge of the Edwards Aquifer (due to the fact that the main stem of the Guadalupe River itself plus the Guadalupe River drainage area within the recharge zone contribute an insignificant amount to recharge). The remaining 468 square miles contribute to recharge through Dry Comal Creek and the Blanco River, and are, therefore, a part of the contributory watershed. The situation is further complicated by the fact that all surface runoff which originates within the 468 square mile drainage area of Dry Comal Creek and the Blanco River, which is not recharged, eventually flows downstream and enters the Guadalupe River. Thus, these 468 square miles contribute to the Guadalupe River both as a portion of the contributory watershed and of the traditional watershed.

The traditional watershed thus consists of the entire surface drainage basin within the topographic confines of the Guadalupe River Basin. Of this area, 468 square miles also are part of the contributory watershed due to recharge to the Edwards which occurs in the Dry Comal Creek and Blanco River watersheds.

Stream flows within the traditional watershed are made up of surface runoff from within the traditional watershed and spring flows conveyed from the contributory watershed. Table 2 provides some basic data regarding the average annual flows and high and low flows for the period of record. Spring flow provides an average of 346,800 acre-feet per year, with a range of 75,600 to 557,600 acre-feet per year.

Surface stream flow from the traditional watershed above the southern boundary of the Edwards Aquifer recharge zone contributes an annual average of 351,500 acre-feet, with a range of 14,700 to 706,600 acre-feet per year.

Surface stream flow from the traditional watershed downstream of the southern boundary of the Edwards Aquifer recharge zone to the USGS gaging station on the Guadalupe River at Victoria amounts to an annual average of 582,088 acre-feet, with a range of 25,300 to 1,487,800 acre-feet per year.

Contribution of Spring Flows to Total Flow in the Guadalupe River

Figure 2 provides a comparison of monthly flow during the 1950-1956 and 1962-1964 time periods from the San Marcos and Comal springs to total flow in the Guadalupe River at Victoria (near the downstream end of the basin). Spring flows, which are fed by the surface flows of the contributory watershed, comprise a significant and extremely important portion of the river flows.

On an average annual basis (1940-1985), spring flows comprise 49.7 percent of the total flow in the Guadalupe River Basin just downstream of the lower edge of the recharge zone (Table 2). Further downstream, at the confluence of the Guadalupe and San Marcos rivers, spring flows comprise 30.6 percent of the total flow in the Guadalupe River. At Victoria, near the lower end of the Guadalupe River Basin, spring flows comprise 25.0 percent of the total flow of the Guadalupe River.

During the drought of record, which lasted for approximately nine years from 1948 through 1956, spring flows averaged 212,800 acre-feet per year, or 48.0 percent of the total annual average flow of 444,600 acre-feet per year in the Guadalupe River just below the confluence of the Guadalupe and San Marcos rivers. On an annual basis during this period, spring flows comprised 76.2 percent of the total flow at the Guadalupe-San Marcos confluence in 1954; over 70 percent in three of the nine years; and over 60 percent of the total in five of the nine years.

TABLE 2 TRADITIONAL WATERSHED

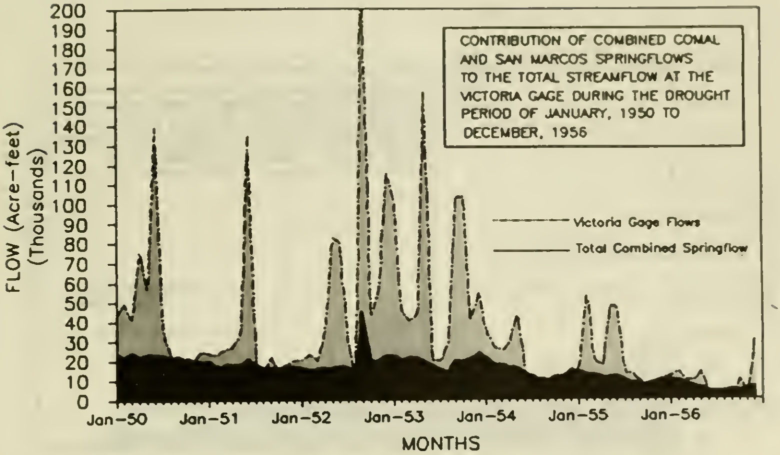
	Drainage Area (sq mi)	Average Annual Discharge (ac-ft/yr)		Discharge Extremes (ac-ft/yr)			
				High		Low	
Springs							
Comal Springs	—	206,500	(1940-85)	295,400	(1975)	28,000	(1956)
Hueco Springs[1]	—	28,500	(1944-74)	94,800	(1968)	[2]	
San Marcos Springs	—	111,800	(1940-85)	167,400	(1975)	47,600	(1956)
Subtotal		346,800		557,600[3]		75,600	
Stream flow							
Above the Lower Edge of Edwards Recharge Zone (excl. spring flow)	2,127	351,500		706,800		14,700	(1956)
At Lower Edge of Recharge Zone (inc. spring flow)	2,127	698,312	(1940-85)	1,284,200	(1973)	90,300	(1956)
From Lower Edge of Edwards Recharge Zone to Victoria	3,071	582,088	(1940-85)	1,487,800	(1973)	25,300	(1956)
Guadalupe River at Victoria	5,198	1,280,400	(1940-85)	3,752,200	(1973)	115,300	(1956)

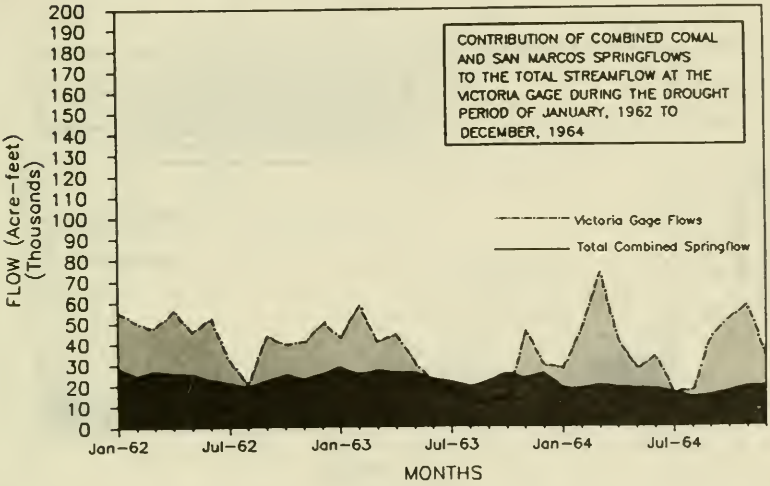
[1] Woodruff and Abbott, 1986, "Stream Piracy and Evolution of the Edwards Aquifer Along the Balcones Escarpment, Central Texas".

[2] Numerous periods of no flow.

[3] Summed for illustration purposes since Hueco Springs flow unavailable for 1975.

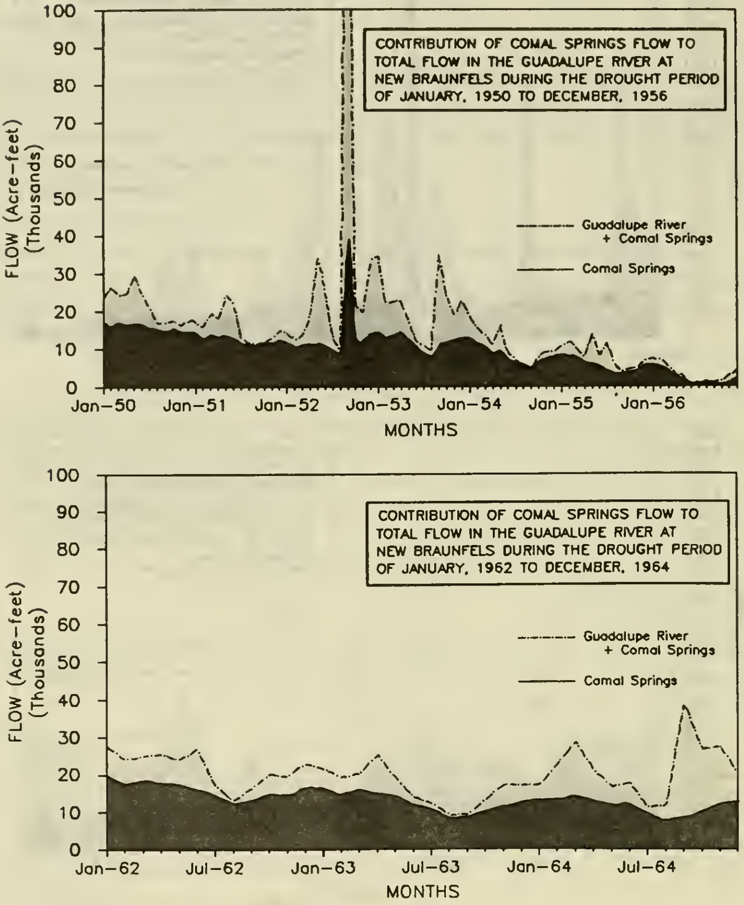
COMPARISON OF SPRINGFLOW TO STREAMFLOW





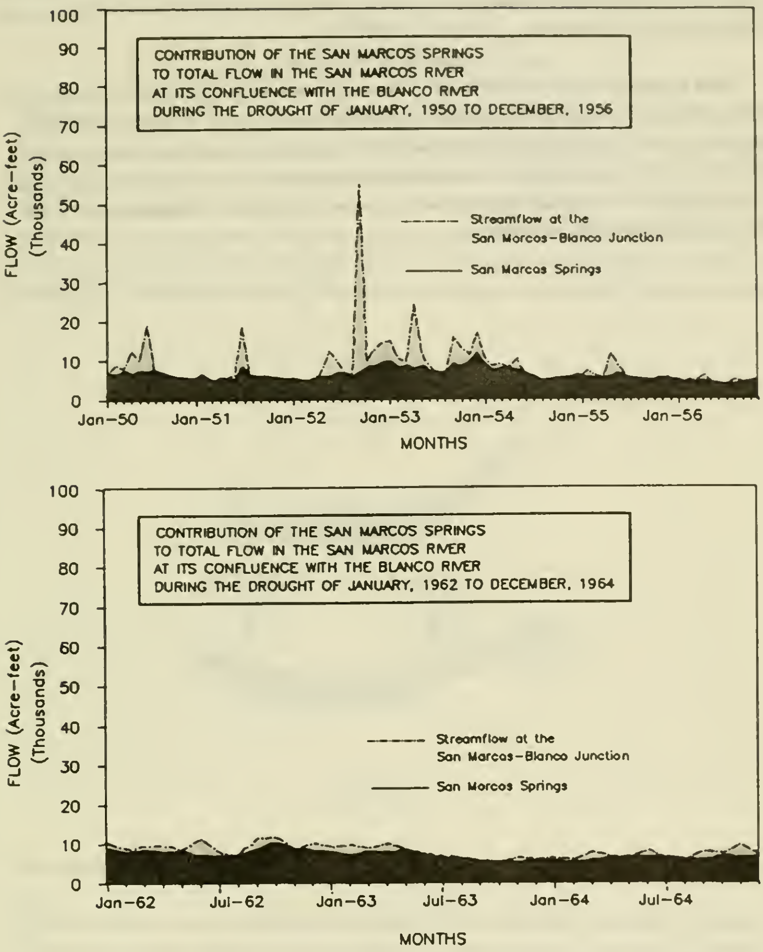
(FIGURE 2)

COMPARISON OF SPRINGFLOW TO STREAMFLOW



(FIGURE 3)

COMPARISON OF SPRINGFLOW TO STREAMFLOW



(FIGURE 4)

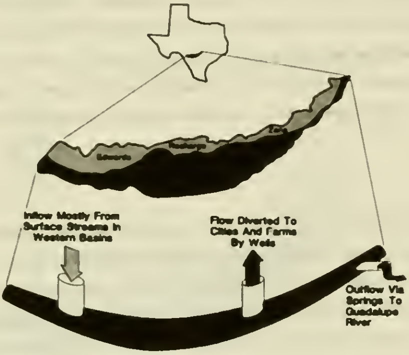
Figure 3 compares Comal Springs spring flow to total flow in the Guadalupe River at New Braunfels during the 1950-1956 and 1962-1964 drought periods. Over the 1940-1985 period, Comal Springs flows have averaged 25.0 percent of the total flow in the Guadalupe River at the confluence of the Comal and Guadalupe rivers. For the 1950-1956 time period, the percentage was 59.2 percent, and for the 1962-1964 time period, the percentage was 65.3 percent.

Figure 4 compares San Marcos Springs spring flow to total flow in the San Marcos River and Blanco River at their confluence for the 1950-1956 and 1962-1964 drought periods. Over the 1940-1985 period, San Marcos spring flows have averaged 48.3 percent of the total flow in the San Marcos and Blanco rivers at their confluence. During the 1950-1956 time period, San Marcos spring flows were 74.4 percent of the total flow. During the 1962-1964 time period, San Marcos spring flows were 86.9 percent of the total flow in the San Marcos and Blanco rivers at their confluence.

THE EDWARDS CONNECTION

By Rollin W. Harden
R.W. Harden & Associates, Inc.

The Edwards Aquifer is a long, narrow conduit through which water moves underground across parts of south-central Texas (Figure 5). The conduit receives and dispenses major amounts of water, averaging about 600,000 acre-feet per year. The Edwards Aquifer supports the two largest springs in Texas in addition to large municipal, industrial, and irrigation supplies, including the supply for the City of San Antonio. The underground water originates largely from surface sources which enter the Edwards in identified reaches of streams mostly west of San Antonio. This water then moves underground toward the east and northeast to be dispensed via springs in the Guadalupe River Basin or to be captured by wells before reaching the springs.


Edwards
Recharge
Inflow Mostly From Surface Streams In Western Basins
Flow Diverted To Cities And Farms By Wells
Outflow Via Springs To Guadalupe River

(FIGURE 5)

Well-Defined Boundaries

The Edwards Aquifer, relating directly to the Guadalupe River Basin, occurs in a band five to 30 miles wide and extends across portions of Kinney, Uvalde, Medina, Bexar, Comal, and Hays counties. It extends 175 miles from near Brackettville in Kinney County to just north of Kyle in Hays County. The Edwards Aquifer has two adjacent sub-bands — a shallower outcrop area where recharge occurs and a deeper, artesian area through which most of the flow moves enroute to the Guadalupe River Basin. The limits of the Edwards Aquifer are defined on the north by its recharge or intake area; on the west by a groundwater divide near Brackettville that separates flow toward Comal and San Marcos springs from flow to the Rio Grande Basin; on the northeast by a groundwater divide near Kyle that separates flow toward San Marcos Springs from flow to the Colorado River Basin; and on the south by the downdip limit of fresh water which is called the "bad-water" line. The lower boundary is the underlying Glen Rose Formation. The upper boundary in the artesian area is the Del Rio Clay.

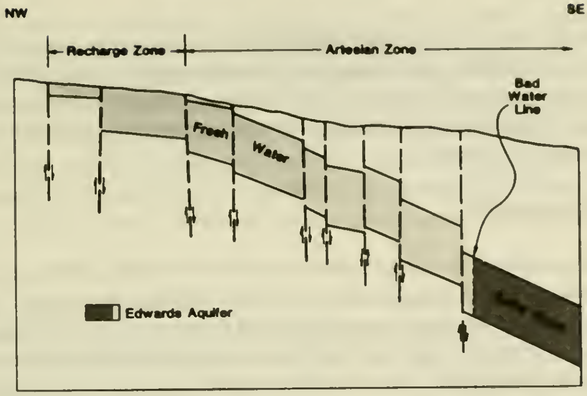
Association with Balcones Fault Zone

The Edwards Aquifer owes its existence to the Balcones Fault Zone and to its limestone and dolomite composition. The Balcones Fault Zone is a closely spaced series of steep-angled step faults which occur in a narrow belt along the Balcones Escarpment (Figure 6). The faulting becomes more intense from west to east. The faulting has created avenues along which significant limestone dissolution and channelling of flow occurs. There are many such avenues, some large and some small. The faults, in combination with the coastward dip of the rocks, place the Edwards beneath streambeds in its recharge area. The faulting also cuts across and connects the higher elevation western (recharge) basins with more easterly basins of progressively lower elevations. The faults form a framework in which a network of openings in the rocks has developed. Springs, the natural spill points of the Edwards Aquifer, are all located along major faults.

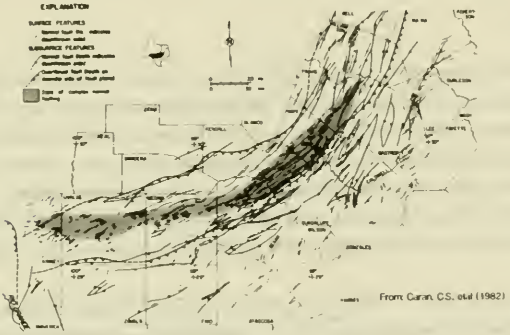
Large Openings

There is a large variability in the type and size of the openings in the Edwards Aquifer. The openings range in size from microscopic to large caverns. They include hairline cracks, open fractures, honeycombed zones, and a wide variety of cavities dissolved out by moving underground waters. Dissolution of the limestone and dolomite has created an extensive network of openings, especially along faults. Also, there are limestone beds within the Edwards Aquifer which have commonly undergone more dissolution than other beds, and so there are tabular zones, as well, in which large openings exist. Many large openings in the subsurface have been encountered while drilling wells. They range from less than a foot to nearly 100 feet; a 90-foot opening has been reported in one well drilled in San Antonio. The relatively large openings are one reason that the Edwards Aquifer is so important and so unique.

SCHEMATIC CROSS SECTION



FAULTS IN SOUTH-CENTRAL TEXAS



From: Caran, C.S. et al (1982)

(FIGURE 6)

Large Well Yields

The large and numerous openings in the Edwards give rise to uncommonly large well yields. Some of the largest well yields in Texas, and in the world, are from wells tapping the Edwards. Yields of 6,000 or 7,000 gallons per minute are common in some areas, and yields of as much as 19,000 gallons per minute are known. Where yields are large, they are more limited by well and pump diameters than by the actual water- yielding capabilities of the Edwards Aquifer.

Excellent Water Quality

The freshwater portion of the Edwards Aquifer (north of the "bad-water" line) contains excellent quality water. The quality reflects both the source of water and the rock through which it travels. The water quality changes very little from the areas at which it enters the Edwards until it exits, even though its flow path is quite long. The quality of the surface water entering the Edwards via recharging streams is similar to the quality exiting at springs and wells. Water along and south of the "bad-water" line changes abruptly in quality. That water contains much higher concentrations of minerals and is charged with hydrogen sulfide. Rocks comprising the Edwards are not nearly as porous south of the "bad-water" line, and consequently the water moves very slowly. Most of the water movement occurs in the freshwater portion of the Edwards.

Unique Fauna

A unique characteristic of the Edwards Aquifer is the presence of a large number of species of invertebrates as well as four vertebrates. The Edwards Aquifer is considered one of the most diverse subterranean aquatic ecosystems in the world. More than 40 species have been identified. Snails, worms, beetles, crustaceans (including shrimp, amphipods, copepods, isopods, and ostracods), salamanders, and catfish are included. Species have been found in wells ranging in depth from 190 feet to 2,000 feet and in numerous wells in the deep, artesian part of the aquifer in Bexar and Uvalde counties. Two species of blind catfish have been recovered from wells more than 1,000 feet deep in southern Bexar County.

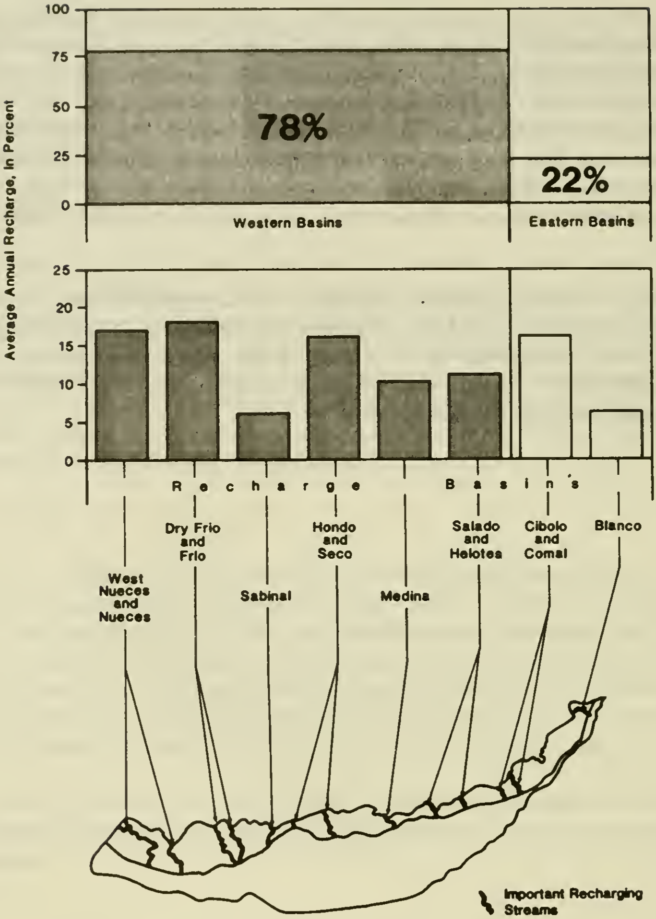
Most groundwater units in Texas contain no animals. Only the Edwards is known to have such a diverse number of highly adapted, aquatic species. Thus far, species have been found in water from 18 wells and a few springs.

Recharge Mostly from Surface Streams

About 75 percent of the recharge to the Edwards Aquifer is from surface streams. Most recharge occurs in short stretches of the main stem of those streams crossing the Edwards outcrop (Figure 7). There are 13 more important recharging streams in all, 10 to the west of San Antonio and three to the east. The most important stream stretches are in the western basins, including the West Nueces, Nueces, Dry Frio, Frio, Sabinal, Seco, Hondo, Medina, Helotes, and Salado. In those 10 basins, about 78 percent of the recharge to the Edwards occurs. Next in importance are the Cibolo and Dry Comal basins which collectively contribute about 16 percent of the recharge. Basins further east, including the Guadalupe and Blanco basins, are relatively unimportant as sources of recharge, contributing only about 6 percent of the Edwards Aquifer recharge.

In many of the recharging stream reaches, all to nearly all of the base flow and large parts of the flood flow contribute to the flow in the Edwards Aquifer. Surface waters, in remarkably large amounts, go underground via joints, fractures, and solution openings in the Edwards. Stream losses of tens to hundreds of acre-feet per day are common over the recharging reaches of the streams. Losses from about a 15-mile stretch of the Frio River have amounted to more than 2,000 acre-feet per day.

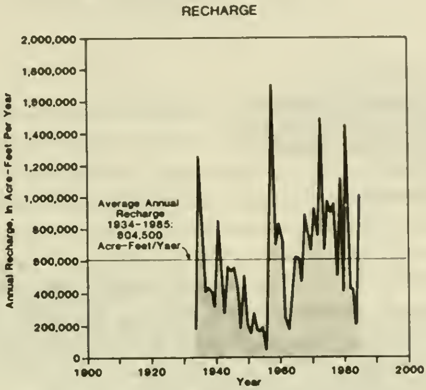
RECHARGE COLLECTION SYSTEM



(FIGURE 7)

Recharge Quite Variable

Recharge over the last 50 years has averaged slightly more than 600,000 acre-feet per year (Table 1 and Figure 8). Recharge has ranged from as little as 44,000 acre-feet per year to as much as 1,700,000 acre-feet per year. The wide variation is due to the widely variable climatic conditions which occur in and adjacent to the recharge area. Recharge averaged only 169,000 acre-feet per year during the 1950-1956 drought period. In comparison, the abnormally wet period of 1970-1981 provided an average recharge of nearly 900,000 acre-feet per year.



(FIGURE 8)

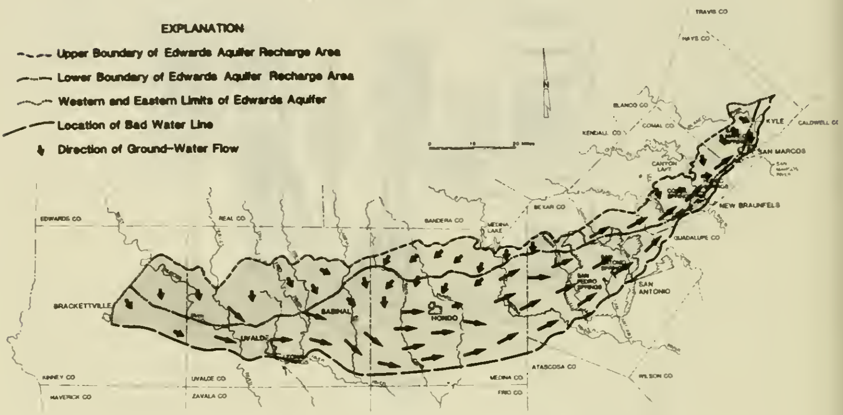
Rapid Water Movement

Once underground, the water flow in the Edwards Aquifer is toward progressively lower elevations, mostly to the south, then toward the east and northeast (Figure 9). The water moves south from the recharge areas into the artesian (confined) part of the aquifer and then from west to east and northeast. The water moves easily because the size and number of solution openings are large and connected with few restrictions. Such conditions are especially prevalent in the eastern half of the Edwards Aquifer's extent.

The range in rate of movement is large, but the movement is nevertheless rapid relative to most underground waters. Movement rates of more than 2,100 feet per day have been measured over short distances. An average movement rate of more than one mile per year is indicated in the area between San Antonio and San Marcos.

The flow in the Edwards Aquifer is rapid enough to result in a suppressed geothermal gradient with relatively cool water temperatures which only vary over a narrow range. Thus, even deep wells have relatively cool water temperatures.

DIRECTION OF GROUND-WATER FLOW



(FIGURE 9)

Originally Most Flow was to Springs Feeding Guadalupe River

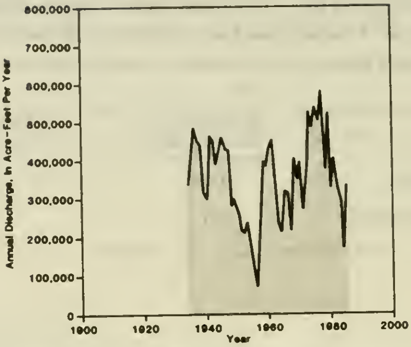
Before wells were drilled, the underground flow in the Edwards Aquifer was all toward springs, which were the only significant natural outlets. Then, as now, most of the spring flow exited the Edwards Aquifer in the Guadalupe River Basin and from the Comal and San Marcos springs. Comal Springs at New Braunfels are the largest group of springs in Texas, and San Marcos Springs at San Marcos are the second largest. Flow measurements for Comal Springs prior to 1927 indicate that flows were mostly between 220,000 and 290,000 acre-feet per year. At that time, flows from San Marcos Springs averaged more than 100,000 acre-feet per year, which is the same as they currently do. Record daily high and low flows are:

	Record High Flow (Acre-Feet/Day)	Record Low Flow (Acre-Feet/Day)
Comal Springs	1,059	0
San Marcos Springs	627	91

Other spring outlets include Leona Springs in Uvalde County, San Antonio and San Pedro springs in Bexar County, and Hueco Springs in Comal County. All of these springs occur at moderate to high elevations, and the outlets flow only during periods of moderate to high water levels in the Edwards. Leona Springs flows as much as 159 acre-feet per day when water levels are high at Uvalde, but averages only about 20 acre-feet per day. The flow of San Antonio Springs has been measured intermittently since 1958. The largest measured discharge was 295 acre-feet per day in 1977. The largest measured discharge from San Pedro Springs was 34 acre-feet per day in 1977. During 1983, San Antonio and San Pedro springs flowed only 25 percent of the time. Hueco Springs has had a maximum discharge of 260 acre-feet per day; Hueco has long periods of low or no flow, and has averaged about 70 acre-feet per day.

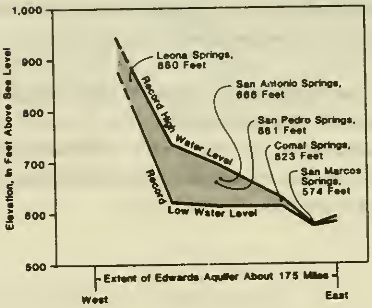
Total flow from all the springs has averaged more than 350,000 acre-feet per year (Figure 10). Comal and San Marcos springs account for 90 to 95 percent of the total. They are the lowest elevation, natural outlets for water in the Edwards Aquifer (Figure 11). They have flowed continually except for a time in 1956 when Comal Springs were dry. For five months in the summer of 1956, Comal Springs did not flow, and San Marcos Springs flowed at a much reduced rate.

DISCHARGE BY SPRINGS



(FIGURE 10)

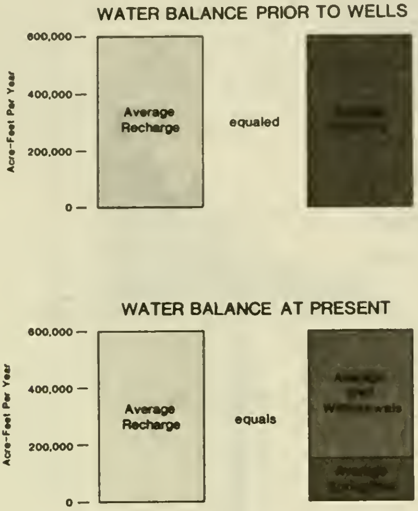
WATER LEVEL AND SPRING ELEVATIONS



(FIGURE 11)

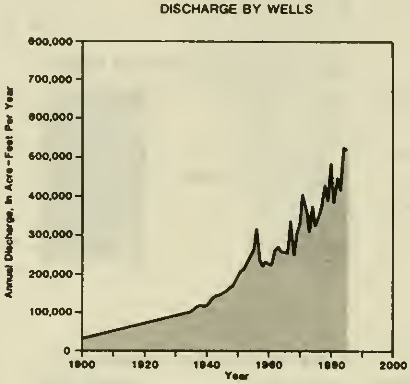
Wells Intercept Springflow

Before being tapped by wells, the spring flow from the Edwards Aquifer was much greater than it is today (Figure 12). Before wells, all of the recharge to the Edwards Aquifer eventually reappeared via springs largely in the Guadalupe Basin. Withdrawals by wells have had a large impact on spring flows and, consequently, have had a large impact on the related surface-water resources in the Guadalupe Basin. Amounts removed by wells are a direct, one-for-one depletion of flow that later would otherwise exit through springs to become a part of the surface-water resources.



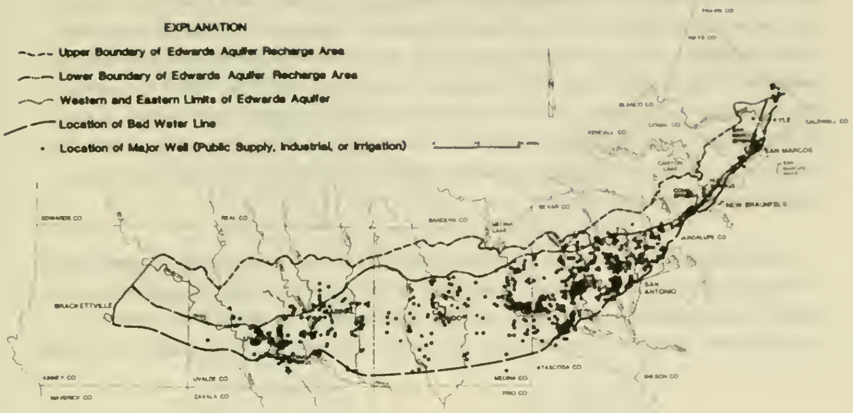
(FIGURE 12)

In about 1900, the total annual discharge by wells was a little over 30,000 acre-feet, nearly all in Bexar County (Figure13). By 1934, the total annual withdrawal by wells had reached about 100,000 acre-feet. Well withdrawals have increased greatly in the past 25 years. Well withdrawals reached 530,000 acre-feet during 1984. Most occurred in Bexar County where 310,000 acre-feet were withdrawn during 1984. Currently, there are about 800 major wells used for public supply, irrigation, and industrial purposes, and the number of wells is increasing (Figures 14 and 15).



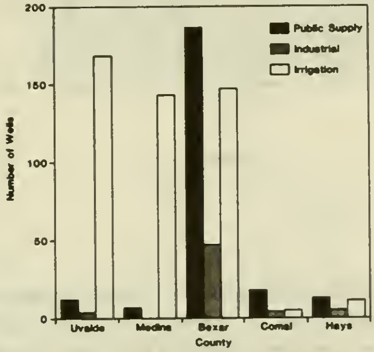
(FIGURE 13)

LOCATIONS OF MAJOR WELLS


EXPLANATION
Upper Boundary of Edwards Aquifer Recharge Area
Lower Boundary of Edwards Aquifer Recharge Area
Western and Eastern Limits of Edwards Aquifer
Location of Bad Water Line
Location of Major Well (Public Supply, Industrial, or Irrigation)
EDWARDS CO
REAL CO
BANDERA CO
BRACKETTVILLE
UVALDE CO
ZAVALA CO
MAVERICK CO
MEDINA CO
FRIO CO
ATASCOSA CO
BEXAR CO
SAN ANTONIO
GUADALUPE CO
NEW BRAUNFELS
COMAL CO
SAN MARCOS
KENDALL CO
BLANCO CO
HAYS CO
CALDWELL CO
MEDINA LAKE
CANYON LAKE

(FIGURE 14)

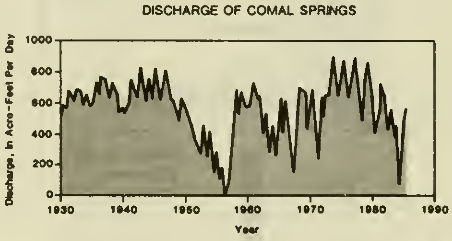
NUMBER AND USE OF MAJOR WELLS



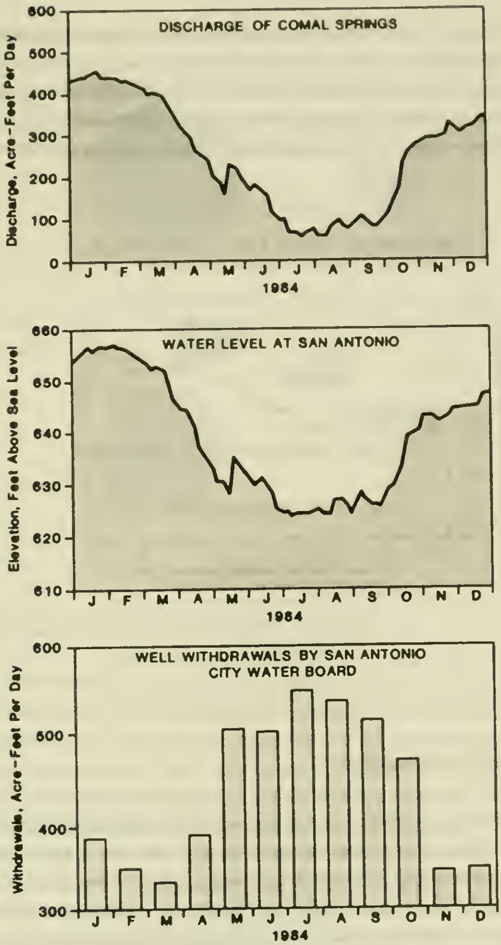
(FIGURE 15)

The direct and immediate effect of well withdrawals on springflow was first observed for San Antonio Springs and San Pedro Springs in Bexar County. These springs supported the early Spanish settlements at San Antonio. Beginning in the late 1890's and early 1900's, numerous flowing wells were drilled. Thereafter, when the wells were allowed to flow, the springs diminished and the resulting flow of the San Antonio River was greatly reduced, at times almost completely ceasing. On the other hand, when the wells were shut in by valves, the springs resumed their usual flow to the river. The well withdrawals at San Antonio have increased greatly over the years. At present, San Antonio and San Pedro springs flow only during wet times when the Edwards Aquifer has been recharged to high levels. These springs flowed continually until about 1945. Now, they are dry for long periods due to increased withdrawals from wells which tend to keep local water levels lower than the outlets of these springs.

Over the years, increased pumping from wells has also had a significant and progressively greater effect on Comal Springs (Figure 16). The severe drought from 1950 to 1956 and pumping by wells, primarily at San Antonio, caused Comal Springs to dry up for about five months in 1956. Well discharge was 321,000 acre-feet in 1956. Since then, well withdrawals have increased, reaching 530,000 acre-feet in 1984. This has resulted in increased depletion of the flow from Comal Springs. Peak summer withdrawals by wells in Bexar County are now more than 1,000 acre-feet per day. The effects of the Bexar County withdrawals have become easily recognizable via the larger seasonal fluctuations both in water levels at San Antonio and in the flow of Comal Springs. The effects are especially pronounced in dry years like 1984, when the flow of Comal Springs decreased from 365 acre-feet per day on April 1 to 54 acre-feet per day by July 18 (Figure 17).



(FIGURE 16)



WELL WITHDRAWALS AFFECT STREAMFLOW

DISCHARGE OF COMAL SPRINGS

WATER LEVEL AT SAN ANTONIO

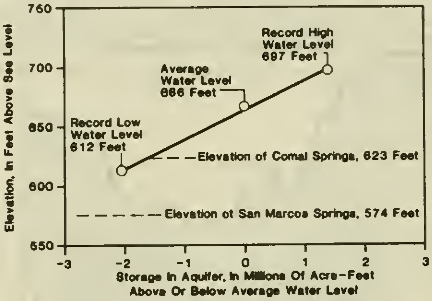
WELL WITHDRAWALS BY SAN ANTONIO CITY WATER BOARD

(FIGURE 17)

Small Storage Capacity

The Edwards Aquifer has relatively small storage capacity, and can be quickly depleted by wells and spring flows during multi-year droughts (Figure18). Between the average water level and the lowest recorded water level for the Edwards Aquifer, the aquifer holds only about 2,000,000 acre-feet. With little recharge (during drought) and with withdrawals by wells of over 500,000 acre-feet per year, there is only a few years' supply available before water levels reach record lows and spring flows are severely impacted or stopped.

CORRELATION OF WATER LEVEL AT SAN ANTONIO
WITH CHANGE IN AQUIFER STORAGE



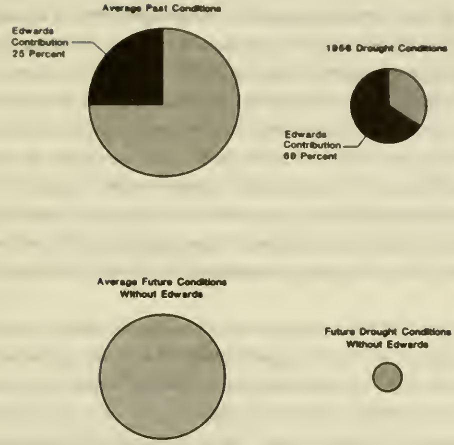
(FIGURE 18)

Well Withdrawals Affect Guadalupe River

Numerous studies, based on estimates of future pumping and assumed repetition of past droughts, project that both Comal and San Marcos springs will dry up for long periods, and even permanently, without the development of alternative water sources to eliminate excessive pumping and depletion of the Edwards Aquifer (Figure 19). If the Edwards Aquifer becomes depleted, the Guadalupe River will also be depleted, and the unique recreational and aquatic environments at and downstream of Texas' largest springs will be destroyed. Downstream water rights also suffer from excessive Edwards pumping, as do river water quality and the freshwater flows to coastal estuarine environments.

EDWARDS AQUIFER'S CONTRIBUTION TO
FLOW OF GUADALUPE RIVER AT VICTORIA

Flow Is Proportional To Area Of Circle



(FIGURE 19)

Legal/Regulatory Considerations and the Edwards Connection

In many respects, the occurrence, distribution and movement of water in the Edwards Aquifer are very similar to surface streams. These similarities and the important, direct relationship to the Guadalupe River lead to consideration of whether the Edwards is essentially an underground stream, making the water therein state water subject to appropriation. From legal and regulatory standpoints, the implications of the Edwards being an underground stream are very important. In jurisdictions outside Texas, various criteria have been utilized in legally defining underground streams. Common criteria have included:

1. Well-defined and known boundaries
2. Definite source of supply
3. Current of water
4. Destination
5. Utility

The applicability of the above criteria to the Edwards Aquifer can be summarized as follows:

Well-Defined and Known Boundaries — The boundaries of the Edwards Aquifer are presently known and well-defined. Earliest studies by geologists of the U. S. Geological Survey in the early 1900's recognized the outcrop of the Edwards, the related position of the Balcones Fault Zone, and the springs emanating from the system. The Balcones Escarpment, a distinct topographic feature, was recognized as trending along the recharge area of the Edwards. To the early geologists, surface indications of the southeasternmost extent of the reservoir were the position of the springs. Since early times, more detailed mapping of the outcrop and recharge areas of the Edwards Aquifer has been completed, and many wells have been drilled in the deeper portions of the aquifer. This has allowed detailed water-level and water quality mapping. These mappings, together with well logs and well locations, now provide more accurate indications of the extent of the Edwards Aquifer.

Water in the Edwards Aquifer is confined at its lower boundary by relatively impermeable zones in the Glen Rose Formation. Its upper boundary in the artesian area is also a confining layer of quite impermeable strata, the Del Rio Clay. The lateral boundaries of the Edwards Aquifer are likewise well-defined. The northern boundary is its northern recharge limit, and its southern boundary is the "bad-water" line. Lateral boundaries occur at the groundwater divides forming the western and northeastern limits of the Edwards. Geologic, water-level and/or water quality mapping have defined these boundaries of the Edwards. Collectively, these physical boundaries represent the known physical limits within which the Edwards water is moving and where it is available to be tapped by wells. All of the water of importance moves within these limits. There are no overly significant additions to or escapes from the system as evidenced by water balance and other studies.

Source of Supply — By far, the largest source of supply of water to the Edwards Aquifer is from surface streams. The Edwards Aquifer is supplied by a unique recharge collection system, with about 75 percent of the recharge occurring directly from surface water which flows into the Edwards Aquifer in streambeds crossing the Edwards outcrop. Recharge by stream losses has been established by actually measuring the losses in the streams via stream-gaging stations and seepage studies and by the mapping of geologic formations. Water quality, water-level, and water balance studies also have aided in determining the source of supply to the Edwards.

Current of Water — The movement of water in the Edwards Aquifer has been established by elevation surveys, flow observations, and tracer studies. Water in the Edwards moves continuously from higher to lower elevations and from recharge areas to discharge points.

Most of the movement in the Edwards is through large openings. Water in the Edwards Aquifer circulates freely along fractures and faults, and through honeycombed zones, channels and caverns. The water in the Edwards Aquifer flows at relatively rapid rates. The movement rate averages more than 5,000 feet per year between San Antonio and Hays County. This is 50 to 500 times faster than for most groundwater in Texas.

Other characteristics which attest to the large openings and the relatively rapid transfer of water are the unique occurrence of aquatic animals, the small storage capacity of the conduit over recorded stages, the turbidity of the water after rains in wells and springs close to recharge sources, and the similar water temperature and water quality throughout the system.

Destination — The water in the Edwards Aquifer has a well-established and definable destination. Historically, and like surface-water reservoirs, the outlets were few. This has been established by studies of the flow of the springs, water levels, water quality, water balance, and the geologic formations. Prior to pumping by wells, Comal and San Marcos springs were the primary destination of the Edwards water. Since the advent of wells, the destination of the flow has been to both wells and springs, with the amount taken by wells being a direct capture of water that would otherwise later flow from springs. The springs, as the natural discharge points for the Edwards, will continue to flow until the amount of water taken from wells becomes so great that water levels drop below the level of the springs.

Utility — The Edwards has sufficient magnitude and volume to be serviceable to the persons through whose land it flows. Indeed, it furnishes large amounts to large numbers of individuals in the cities, farms, and ranches overlying its extent. Use in 1985 included:

	Acre-Feet
Domestic, Stock and Miscellaneous	39,200
Industrial	16,500
Irrigation	203,100
Municipal and Military	263,700
Springs	334,000
Total	856,500

Uniqueness of Edwards Aquifer

The Edwards is quite unique in its observable, direct relationship with surface waters. The Edwards Aquifer captures much of the surface waters flowing across its outcrop in the western basins and furnishes much of the surface-water resources in the Guadalupe River. Such a trans-basin diversion system is unknown among other underground waters in Texas both in amount and distance. Moreover, the pumping of wells quickly and observably diminishes spring flow and adversely impacts the flow of the Guadalupe River. With enough pumping by wells, the remaining Edwards-derived surface-water resources of the Guadalupe River could be totally expropriated. Nowhere else in Texas does the same situation exist, wherein such a major surface-water resource can be so directly and quickly affected by wells.

THE STATE OF TEXAS OWNS THE WATERS IN THE EDWARDS AQUIFER IN TRUST FOR THE BENEFIT OF THE PUBLIC

By Roger Nevola
Vinson & Elkins

Summary

All water beneath the surface of the ground in Texas is presumed to be percolating groundwater, which is owned by the landowner, unless and until it is established that such water is in an underground stream or the underflow of a surface stream. Water in the Edwards Aquifer should no longer be presumed to be percolating groundwater. Based on the information set forth in Sections 1 and 2 of this report and relevant legal authority, it is clear that the Edwards is an underground stream, and that the water in the Edwards is owned by the State of Texas in trust for the benefit of the public.

Underground streams are subject to the same rules of law as any other Texas stream. When the State of Texas (or previous sovereign) granted lands that contain a watercourse within the boundaries of the grant, such as lands overlying an underground stream, it retained ownership of the waters in that stream. The sovereign thereafter maintained its ownership of such waters unless it subsequently conveyed title to such waters by clear, express, and unequivocal terms.

In enacting certain legislation in the past relating to the Edwards, the Texas Legislature may have presumed, based on the information presented to it at the time, that water in the Edwards is percolating groundwater. As discussed above, such a presumption was entirely proper. However, the Legislature was careful never to convey title to such water. Water in the Edwards remains state water today.

It is well-established that the waters of the numerous rivers and creeks that feed the Edwards are owned by the State of Texas. The primary source of the water flowing through the Edwards is its tributary streams – about 75 percent of the water in the Edwards is from the flows of these streams. The major tributary streams include the West Nueces, Nueces, Dry Frio, Frio, Sabinal, Seco, Hondo, Medina, Helotes, Salado, Cibolo, Dry Comal, and Blanco. Typically, all to nearly all of the base flows and large portions of the flood flows of these streams feed the Edwards, and through it, the Guadalupe River.

It is also well-established that the waters of the Guadalupe River and its tributaries are owned by the State of Texas. The Edwards is the major tributary of the Guadalupe River. Waters from the tributary streams of the Edwards flow freely through the Edwards to the Comal and San Marcos springs in the Guadalupe River Basin. The flow from the Edwards constitutes a significant portion of the flow of the Guadalupe River during normal weather conditions, and most of the flow of the Guadalupe River during dry conditions.

As discussed in Section 4 of this report, it is essential that uses of water from the Edwards and the Guadalupe River be regulated conjunctively, and that the regulation be implemented quickly, before the next major drought. Diversions from the Edwards reduce the flow from the Edwards to the Guadalupe, the same as diversions of water from any other tributary would reduce the flow of that tributary to the Guadalupe. Current diversions from the Edwards are very large (in excess of 500,000 acre-feet per year). Diversions are expected to increase even further if there is no regulation.

The State of Texas, under the jurisdiction of the Texas Water Commission, already has in place a well-developed system of regulation of its state-owned waters. The tributaries of the Edwards are included in the existing system. The Guadalupe River and its surface tributaries are included in this existing system of regulation. The Edwards also is subject to this existing system of regulation because of the state's ownership of its waters.

The state would have the power to regulate the use of water from the Edwards even if such water were not owned by the state. However, an effective system of conjunctive regulation of the Edwards and connected surface streams can be implemented much more quickly and efficiently because all of the water is owned by the state.

It is unclear what rights exist today to use water from the Edwards. Rights to use water from the Edwards may have been explicitly granted by language in the grants of land overlying the Edwards. Additionally, under general law, owners of such land may have riparian rights to use water for domestic and livestock purposes and, perhaps, for other uses. Rights to use also may have been acquired under the appropriation statutes of the state.

In order to be certain of the nature and extent of any existing rights to use water from the Edwards, all claims of such rights would have to be adjudicated. Virtually all claims of rights to use state-owned surface water in Texas have already been adjudicated. About 25 years ago, claims of rights in the Lower Rio Grande Basin were adjudicated in a proceeding initiated in state district court. More recently, claims in other river and coastal basins have been adjudicated in proceedings initiated before the Texas Water Commission pursuant to the 1967 Texas Water Rights Adjudication Act, §11.301, et seq., Texas Water Code. The Legislature may have intended that the Adjudication Act apply only to surface streams, and not to underground streams.

Rights to use water from the Edwards may be acquired today for current or proposed uses by following the process required to obtain the right to use any state water. Under this process, permits may be obtained from the Texas Water Commission pursuant to Section 11.121 of the Texas Water Code. The Legislature may also be able to grant rights to use by direct legislative grant. Such a direct grant may be most efficient and equitable if it appears that many current users of water from the Edwards do not have any valid right to use such waters.

Analysis

A. Title to Waters in Underground Streams Was Not Conveyed to Landowners as Part of Lands Granted by the State of Texas or Previous Sovereigns

All water in Texas can be classified as either state water or private water. Private water is that water conveyed to the landowner by the sovereign as part of the property granted. *Houston & T. C. Ry. Co. v. East*, 98 Tex. 146, 81 S.W. 279, 281 (1904). State water is that water owned by the State of Texas in trust for the benefit of the public. *Motl v. Boyd*, 116 Tex. 82, 286 S.W. 458, 468 (1926).

Whether an underground stream was conveyed to the landowner as part of the property granted or was retained by the sovereign in trust for the benefit of the public must be decided under the laws of the sovereign that existed at the time of the grant. *State v. Valmont Plantations*, 346 S.W. 2d 853, 855 (Tex. Civ. App. – San Antonio 1961), aff'd, 355 S.W.2d 502 (Tex. 1962). Spanish and Mexican land grants are governed by the civil law of Spain and Mexico, id. Grants by the State of Texas are governed by the common law as interpreted by the state courts until the enactment of the statutes defining state water, from which point forward the terms of the statutes are controlling. *Kraft v. Langford*, 565 S.W.2d 223, 228 (Tex. 1978); *State v. Sun Oil Co.*, 114 S.W.2d 936, 945 (Tex. Civ. App. – Austin 1938, writ ref'd).

As discussed below, regardless of the sovereign, grants of land overlying underground streams did not convey title to the waters in such streams.

1. Texas Grants

Under Texas law, percolating groundwater is private water. *Houston & T. C. Ry. Co. v. East*, 81 S.W. at 280-281. Percolating groundwater is defined as groundwater other than underground streams and the underflow of streams. Percolating groundwater is water percolating, oozing, or filtering through the earth. *Bartley v. Sone*, 527 S.W.2d 754, 760 (Tex. Civ. App. – San Antonio 1974, writ ref'd n.r.e.); *Cantwell v. Zinser*, 208 S.W.2d 577, 579 (Tex. Civ. App. – Austin 1948, no writ). Texas Water Code § 52.001 (4) defines "underground water " for the purposes of underground water districts to mean "water percolating below the surface of the earth and that is suitable for agricultural, gardening, domestic or stock raising purposes, but does not include defined subterranean streams or the underflow of rivers." All underground waters are presumed to be percolating water. *Pecos County Water Control and Improvement District No. 1 v. Williams*, 271 S.W.2d 503, 506 (Tex. Civ. App. – El Paso 1954, writ ref'd n.r.e.); *Texas Co. v. Burkett*, 117 Tex. 16, 296 S.W. 273, 278 (1927).

In *Bartley v. Sone*, the court recognized the general rule that the owner of land owns the percolating waters underneath the land, but then stated: "The rules referred to in the two preceding paragraphs are not applicable to water flowing in a subterranean stream or to the overflow of rivers." 527 S.W.2d at 760. *See also Texas Co. v. Burkett*, 296 S.W. at 278.

This statement is consistent with the general rule followed in other jurisdictions that underground streams are state water. In *Howard v. Perrin*, 8 Ariz. 347, 76 P. 460 (1904), the court said:

> Throughout the Pacific Coast, where the doctrine of appropriation obtains, the decisions are uniform to the effect that waters percolating generally through the soil beneath the surface are the property of the owners of the soil, but that subterranean streams, flowing in natural channels, between well-defined banks, are subject to appropriation under the same rule as surface streams.

76 P. at 462; *see also* Wiel, *Water Rights in the Western States*, Vol. II, §1077 (1911).

2. Spanish and Mexican Grants

According to the leading United States case discussing this issue, the ancient civil law, like the common law, distinguished between underground streams as public water and percolating water as private water. *Maricopa County Municipal Water Conservation District No. 1 v. Southwest Cotton Co.*, 39 Ariz. 65, 4 P.2d 369 (1931). In that case, the court stated:

> There are two great systems of law recognized in Western civilization: The common law, pertaining particularly to the English-speaking countries, and the civil law, which is found principally in those nations where the influence of the old Roman law from which it comes, and has been, the strongest. Both of these systems distinguish between well-defined natural streams on the one hand, and subterranean, percolating waters on the other. So far as the second is concerned, the principle governing them was, originally at least, the same under both

> systems. All rights to subterranean waters not flowing in definite, known channels belonged to the owners of the soil.

4 P.2d at 372. *See also, Haldeman v. Bruckhart*, 45 Pa. 514, 520 (1863). *Maricopa County* notes that Spain and Mexico generally followed the principles of ancient civil law. Las Siete Partidas did state the springs and wells in Spain went with the land, and were not for common use. But according to *Maricopa County*, these rules applied only to percolating waters. 4 P.2d at 373.

Although no Texas case has yet dealt with this issue, the decision in a recent case dealing with the application of Spanish law to land grants in Texas is consistent with this position. In *In Re the Adjudication of the Water Rights in the Medina River Watershed of the San Antonio River Basin*, 670 S.W.2d 250, 252-253 (Tex. 1984), the Texas Supreme Court held that under the law of New Spain and Mexico, *all* watercourses were public. The court does not distinguish between watercourses above or under the surface of the ground.

B. Definition of an Underground Stream

Texas case law has not yet defined the term "underground stream." However, the definition of an underground stream has been thoroughly discussed in other jurisdictions.

Other jurisdictions have agreed that an underground stream is a stream under the surface of the ground that has the same characteristics of a surface watercourse. *Maricopa County*, 4 P.2d at 376 (1931); *City of Pasadena v. City of Alhambra*, 180 P.2d 699, 720 (Cal. App. 1947); *Wheatley v. Baugh*, 25 Pa. 528, 531, 64 Am. Dec. 721 (1855). In *Huber v. Merkel*, 117 Wis. 355, 94 N.W. 354 (1903), the court stated:

> It is not meant by [underground stream] that there must be an open channel or fissure in the rock, through which water flows freely and rapidly, in order that there may be a defined subterranean stream (such channels are rare, if in fact they ever exist), but simply that the water, whether moving slowly or rapidly, and whether passing through sand or gravel or porous rock, must have the characteristics of a stream, in that it has a course, and a channel with definite bounds. Such subterranean streams doubtless exist ...

94 N.W. at 355-356.

Many characteristics may indicate the presence of a watercourse, either above or below the surface of the ground. These characteristics include a current of water. *Hoefs v. Short*, 273 S.W. 785, 787 (Tex. 1925). They also include a source of supply. *Pecos County Water Control and Improvement District No. 1 v. Williams*, 271 S.W.2d at 506; *Hoefs v. Short*, id. A destination for the water may be a characteristic of a watercourse. *Pecos County Water Control and Improvement District No. 1 v. Williams*, id. Another characteristic of a watercourse is that it has utility, that is, that it "is of sufficient magnitude or volume to be serviceable to the persons through or along whose land it flows." *Hoefs v. Short*, 273 S.W. at 788.

An underground stream must also have defined and known boundaries. In this context, "defined" means a contracted and bounded channel, though the course of the stream may be undefined by human knowledge. *City of Los Angeles v. Pomeroy*, 124 Cal. 597, 57 P. 585, 598 (1899); *N.S.V. Fallbrook Public Utility District*, 347 F.2d 48, 56 (9th Cir. 1965). "Known" refers to knowledge of the course of the stream by reasonable inference. *City of Los Angeles v. Pomeroy*, id.; *Medano Ditch Co. v. Adams*, 29 Colo. 317, 68 P. 431, 434 (1902).

Both surface and subsurface indications, as well as scientific opinion may be used to demonstrate the existence and location of an underground stream. *Maricopa County*, 4 P.2d at 376. Courts have accepted many types of evidence to indicate that an underground stream has the characteristics of a watercourse.

For example, the presence of surface depressions or sinks has been used as an indication of an underground stream. *Medano Ditch Co. v. Adams*, 68 P. at 433; *Tampa Waterworks Co. v. Cline*, 37 Fla. 586, 20 So. 780 (1896). In *Tampa Waterworks Co.*, the land at issue was underlaid by a rock of limestone formation. From a spring east and northeast, across the land of both parties, were surface depressions or sinks. The court held that "the depressions and surface indications in a direct line over the lands of the parties, and for some distance further east, indicate a subsurface stream as found in limestone formations," *id.* at 785.

The presence of a considerable amount of water may be an indication of an underground stream. This is especially true if the amount of water is considerable even in the dry season, and if this is evidence that the water originated from a considerable distance away. *Hayes v. Adams*, 109 Or. 51, 218 P. 933, 935 (1923); *Cantwell v. Zinser*, 208 S.W.2d at 579; *Huelsmann v. Ohio*, 56 Ohio App.2d 100, 381 N.W.2d 950, 954 (1977).

The fact that pumping in one well has a direct and immediate impact on the flow of another well or of a spring is evidence of an underground stream. *Nashville, C. & St. L. Ry. v. Rickert*, 89 S.W.2d 889, 896 (Tenn. Ct. App. 1936); *Whitmore v. Utah Fuel Co.*, 73 P. 764, 767 (Utah 1903); *Burroughs v. Satterlee*, 67 Iowa 396, 25 N.W. 808, 810 (1885); *Keeney v. Carillo*, 2 N.M. 480, 495-496 (1883); *Medano Ditch Co. v. Adams*, 68 P at 433. But this evidence alone is not sufficient to prove the existence and location of an underground stream. *Pecos County Water Control and Improvement District No. 1 v. Williams*, 271 S.W.2d at 507; *Taylor v. Welch*, 6 Or. 198, 201 (1876).

That the quality of the recharge water, the stored water, and the discharge water are similar is also an indication of an underground stream. *Hayes v. Adams*, 218 P. at 936; *Maricopa County*, 4 P.2d at 377; *Medano Ditch Co. v. Adams*, 68 P. at 433; *Washington County Water Co. v. Garver*, 91 Md. 398, 46 A. 979, 981 (1900). In *Medano Ditch Co.*, the court was called upon to determine whether Medano Creek fed the Big and Little springs creeks through an underground stream. In reaching the conclusion that it did, the court considered testimony that when the Medano Creek was muddy, the flow of the Big and Little springs creeks would also show discoloration. Similarly, in *Washington County Water Co.*, the issue was whether a stream which ran into a sinkhole fed some springs. The court stated:

> It may also be remarked that the fact that muddy water found its way from the stream to the spring affords an additional proof that it passed underground in a channel, and did not percolate through gravel and sand, as suggested by the defendant, for, if it had reached the spring by percolation, it would have been clarified and freed from mud.

46 A. at 981.

The fact that water sinks into the ground and reappears at a different place is also an indication of an underground stream. *Whitmore v. Utah Fuel Co.*, 73 P. at 767; *Keeney v. Canello*, 2 N.M. at 495.

Further, the geologic history of the formation of an underground stream is acceptable evidence to prove the existence of an underground stream. *Olson v. City of Wahoo*, 124 Nebr. 802, 248 N.W. 304, 305; *Maricopa County*, 4 P.2d at 377; *Medano Ditch Co. v. Adams*, 68 P. at 433-434. In *Medano Ditch Co.*, in reaching the conclusion that an underground stream exists, the court discusses at length the history of the formation of the stream, and notes that "scientific writers on the geologic formations and conditions of the San Luis Valley tend to support this theory." 68 P. at 433-434.

In addition, the presence of bedrock or impervious filling which forms the bottom or bed is evidence of an underground stream. *Ryan v. Quinlan*, 45 Mont. 521, 124 P. 512, 515 (1912). Evidence from a series of wells or borings or tunnels is acceptable to demonstrate an underground stream. *Maricopa County*, 4 P.2d at 377. The presence of fissures in the earth may indicate an underground stream. *Deadwood Cent. R. Co. v. Barker*, 86 N.W. 619, 622 (S. D. 1901).

The presence of vegetation in a certain area is an accepted indication of an underground stream. *Hale v. McLea*, 53 Cal. 578, 580-581 (1879); *Hayes v. Adams*, 218 P. at 936 (1923); *Commonwealth of Kentucky v. Sebastian*, 345 S.W.2d 46, 47 (Ken. 1961). The sound of running water under the ground also may be evidence of the presence of an underground stream. *Ryan v. Quinlan*, 124 P. at 515; *Maricopa County*, 4 P.2d at 377. The presence of fish is also evidence of an underground stream. *Tampa Waterworks Co. v. Cline*, 37 Fla. 586 § 2080.780 (1896).

It should be noted that there is a line of cases which holds that the existence and location of an underground stream may be demonstrated only by surface indications which would have, or should have, alerted a reasonable layperson to the existence and location of an underground stream; the existence and location of the underground stream may not be demonstrated by excavation or scientific opinion. *See, e.g., Logan Gas Co. v. Glasgo*, 122 Ohio St. 126, 170 N.E. 874, 876 (1930); *Barclay v. Abraham*, 121 Iowa 619, 96 N.W. 1080, 1081-1082 (1903); *Board of Sup'rs of Clark County v. Mississippi Lumber Co.*, 80 Miss. 835, 31 S. 905, 906 (1902); *Clinchfield Coal Corp. v. Compton*, 148 Va. 437, 139 S.E. 308, 311 (1927).

The issue in this line of cases, however, was not whether an underground stream is public water, but whether a person is liable for interfering with the underground water supply of another. *See, e.g.*, 29 A.L.R.2d 1354 et seq. In cases involving liability for damages, the courts reason that a person cannot be liable for damages to another which he could not reasonably foresee. *Wheatley v. Baugh*, 25 Pa. at 532; *Collins v. Chartiers Val. Gas Co.*, 131 Pa. St. 143, 18 A. 1012, 1013 (1890). This reasoning does not apply to whether an underground stream is public water, since reasonable foreseeability is not an issue in that inquiry.

Many cases have directly rejected the argument that underground streams may be proved only by surface indications, even in cases involving liability for damages. *See, e.g., The Castalia Trout Club Co. v. The Castalia Sporting Club*, 8 Ohio Cir. Ct. R. 194, 203 (1893) *aff'd*, 56 Ohio St. 749, 49 N.E. 1108; *Collins v. Chartiers Val. Gas Co.*, 18 A. at 1013-1014; *cf. Maricopa County Municipal Water Conservation Dist. No. 1 v. Southwest Cotton Co.*, 4 P.2d at 377 (Surface indications are not an exclusive means of proof where issue was whether underground streams are subject to appropriation). The rationale of these cases is that the knowledge available to a reasonable person is expanding, and this fact should be taken into account. Thus, Kinney says in *Irrigation and Water Rights*, § 1155:

> The first of these subterranean watercourses have all of the characteristics of surface water courses, that is to say, they have bed, banks forming a channel, and a current of water. The second class, while upon the one hand, may have all of these characteristics, upon the other hand these, as their names indicate, are still unknown and undefined. However, that they are there is well known as a scientific fact, and as the years go on, by exploitation of these streams many of the underground water courses in the latter class, which were formerly undefined and unknown, become defined and known, and thus pass from the second class to the first.

(Footnotes omitted)

See also, Collins v. Chartiers Val. Gas Co., 18 A. at 1013-1014. And many other cases have accepted scientific opinion without discussion. *See, e.g., Olson v. City of Wahoo*, 124 Nebr. 802, 248 N.W. 304 (1933); *Cantwell v. Zinser*, 208 S.W.2d 577 (Tex. Civ. App. — San Antonio 1974, writ ref'd n.r.e.); *Yarwood v. West Los Angeles Water Co.*, 132 Cal. 204, 64 P. 275 (1901).

C. The Edwards Is an Underground Stream

Considering the information set forth in Sections 1 and 2 of this report in light of the legal authorities discussed herein, it is clear that the San Antonio region of the Edwards Underground Reservoir is an underground stream. Some of the relevant factors are discussed below.

The source of supply of water to the Edwards is clearly established. About 75 percent of the water comes from the flows of the rivers and creeks that are tributary to the Edwards. The remainder is diffused surface water. These two sources of supply (flow from defined tributaries and diffused surface water) are the same for any significant surface stream in Texas.

The destination of the water in the San Antonio region of the Edwards Underground Reservoir also is clearly established. Virtually all of the flow not diverted by wells feeds the Guadalupe River through the Comal and San Marcos springs.

The current of water in the Edwards also is well-documented. Water flows freely through caverns, fractures, honeycombed zones, and other cavities dissolved out by the water moving to the Comal and San Marcos springs. The average rate of movement is 50-500 times faster than most groundwater in Texas. Rates of more than 2,100 feet per day have been measured over short distances.

The utility of the Edwards is clearly demonstrated by the large diversions and the various uses of diverted water. In 1985, over 500,000 acre-feet of water were diverted and beneficially used for municipal, industrial, irrigation, and other purposes. Diversions of water from the Edwards decrease the flows in the Guadalupe River significantly.

The boundaries of the Edwards are well-defined. The Edwards is a long, narrow conduit to the Comal and San Marcos springs. Water is confined at the lower boundary by the relatively impermeable zones in the Glen Rose Formation, and at the upper boundary in the artesian area by a confining layer of quite impermeable strata, the Del Rio Clay. The northern boundary is its northern recharge limit, and the southern boundary is the "bad water" line.

The Edwards is one of the most diverse subterranean aquatic ecosystems in the world. Over 40 species have been found, including shrimp, salamanders, and catfish, in wells ranging in depth from 190 feet to 2,000 feet.

D. Title to Water in the Edwards Has Never Been Conveyed Subsequent to the Grant of Lands Overlying the Edwards.

1. Spain and Mexico

It was a fundamental principle of Spanish law that grants of property rights were not to be inferred. *In Re Adjudiciation of the Water Rights in the Medina River Watershed of the San Antonio River Basin*, 670 S.W.2d at 253. In New Spain, the government held title to all land and water and retained title to such unless specifically granted, and there was no grant of title or right by implication. *In Re the Adjudication of the Water Rights In the Medina River Watershed of the San Antonio River Basin*, 645 S.W.2d 596, 605-606 (Tex. Civ. App. – San Antonio 1982), rev'd on other grounds, 670 S.W.2d 250 (Tex. 1984); *see also, Harris v. O'Connor*, 185 S.W.2d 993, 1009 (Tex. Civ. App. – El Paso 1944, writ ref'd w.o.m.). No subsequent grant by Spain or Mexico of title to the water in the Edwards has been found.

2. Texas

Under Texas law, the general rule is that legislative grants of property must be construed strictly in favor of the state, and what is not unequivocally granted in clear and explicit terms is withheld. *Empire Gas & Fuel Co. v. State*, 47 S.W.2d 265, 272 (Tex. 1932); *United States v. 1,078.27 Acres of Land*, 446 F.2d 1030, 1038-1039 (5th Cir. 1971).

For example, title to lands underlying navigable water is held in trust by the State of Texas for the public. Title to such land passes by grant or sale only when so expressly provided by the sovereign authority, and there is no presumption that there has been any act by the government which could have the effect of passing title. *State v. Bradford*, 50 S.W.2d 1065, 1069-1070 (Tex 1932); *City of Galveston v. Mann*, 143 S.W.2d 1028,.1034 (Tex. 1940). Similarly, in this case, the waters of the Edwards are held in trust by the state for the public. Therefore, the title to these waters can pass only when expressly authorized by the Legislature, and there is no presumption that such title has passed.

No general Texas statute has conveyed title to state water. No act passed by the Texas Legislature specifically addressing the Edwards conveyed title to the waters in the Edwards.

Although the Texas Legislature has never conveyed title to water in the Edwards, it has enacted various acts that relate to the Edwards. Two that concern the Edwards directly are discussed below.

In 1959, the Texas Legislature passed an act creating the Edwards Underground Water District. 1959 Tex. Gen. Laws, ch. 99 at 173. Section 1 of the act provides that the District is created for the purpose of conserving, protecting, and recharging the underground water-bearing formations within the District, and for the prevention of waste and pollution of underground water, particularly the waters of the Edwards limestone and associated formations. Section 16 of the act recognized existing rights in underground water, but provided that no additional rights are granted:

> The ownership and rights of the owner of the land, his lessees and assigns, in the underground water are hereby recognized, and nothing in this Act shall be construed as depriving or devising such owner, his assigns or lessees, of such ownership or rights. This Act shall not be construed to be a grant of any rights of superior existing permits or water rights.

The term "underground water" was not defined in the act. However, at the time the act was passed, "underground water" was defined in Art. 7880-3C, V.T.C.S. (pursuant to which underground water conservation districts could be created), as follows:

> (3) "Underground water" is water suitable for agricultural, gardening, domestic or stock raising purposes, percolating below the earth's surface, and does not include defined subterranean streams or the underflow of rivers.

This definition is similar to the current definition of "underground water" in § 52.001 of the Texas Water Code, which is quoted above. Although this definition applies only to the term as used in the general underground water conservation district statute, it is likely that "underground water " has the same meaning when used in the act creating the Edwards District.

The Edwards District act has been amended from time to time. In the most recent amendment, the District was given additional powers relating to the development, implementation and enforcement of a drought management plan. The act as it presently exists does not recognize the need for conjunctive regulation of the Edwards and connected surface streams.

Subsections (c) and (d) of § 11.023 of the Texas Water Code also relate to the Edwards. These provisions, which were added by the Legislature in 1957, provide as follows:

> (c) Unappropriated storm water and floodwater may be appropriated to recharge underground freshwater bearing sands and aquifers in the portion of the Edwards underground reservoir located within Kinney, Uvalde, Medina, Bexar, Comal, and Hays counties if it can be established by expert testimony that an unreasonable loss of state water will not occur and that the water can be withdrawn at a later time for application to a beneficial use. The normal or ordinary flow of a stream or watercourse may never be appropriated, diverted, or used by a permittee for this recharge purpose.
>
> (d) When it is put or allowed to sink into the ground, water appropriated under Subsection (c) of this section loses its character and classification as storm water or floodwater and is considered percolating groundwater.

It appears that the Legislature, at the time that it enacted the laws discussed above, may have presumed that water in the Edwards is percolating groundwater. As discussed above, such a presumption was entirely proper. However, the Legislature was careful never to convey title to any water in the Edwards and, therefore, such water remains state water today. The presumption that such water is percolating groundwater can be overcome at any time upon establishment that the Edwards is in fact an underground stream.

CONJUNCTIVE REGULATION OF THE EDWARDS AND CONNECTED SURFACE STREAMS — A CRUCIAL STEP TOWARD SOLVING THE PROBLEM

Increased use of water from the Edwards Aquifer has been substantial as regional population has grown, particularly around the City of San Antonio, and irrigation has increased in Kinney, Uvalde, and Medina counties, Texas. In 1934, the total diversion from the Edwards was 102,000 acre-feet. In 1985, 522,500 acre-feet were diverted. Based on 1982 data, water from the Edwards is used for municipal use (59 percent), industrial use (3 percent), irrigation (29 percent), and other uses (9 percent).

Current levels of diversions from the Edwards cannot be sustained if another drought occurs equal to or greater in severity than the drought of record. Inflows to the Edwards during the drought of record in the Guadalupe River Basin (from 1948 to 1956) averaged only 212,800 acre-feet per year. Current annual use is well over twice this amount.

Continued population growth is predicted for the region which currently is dependent upon the Edwards as its sole source of water. As a result of the anticipated population growth and the attendant rise in economic activity, average water requirements in the region served by the Edwards are projected to rise to approximately 600,000 acre-feet in 2010 and approximately 900,000 acre-feet In 2040.

In 1956, the Comal Springs ceased to flow for a five-month period, and the San Marcos Springs were reduced to a minimum flow of 46 cubic feet per second. Because of the increased diversions from the Edwards since 1956, spring flows now fluctuate dramatically during less severe drought conditions. It is projected that, if diversions from the Edwards are allowed to increase, the springs will become intermittent and finally cease to flow except during periods of high rainfall.

Over the 1940-1985 period, flows from the Comal and San Marcos springs comprised 30.6 percent of the total flow in the Guadalupe River on an average annual basis at (just downstream of) the confluence of the Guadalupe and San Marcos rivers. In the Lower Guadalupe Basin near Victoria, spring flows comprised 25.0 percent of the total average annual flow of the river.

Over the nine-year drought of record in the Basin (from 1948 to 1956), spring flows were 48.0 percent of the average annual flow at the Guadalupe/San Marcos confluence. More significantly, spring flows comprised 76.2 percent of the total river flow at the Guadalupe/San Marcos confluence in one of the nine years (1954), over 70 percent in three of the nine years, and over 60 percent in five of the nine years.

The relative contribution from the Edwards to the flow of the Guadalupe River, over any period of time, would have been significantly greater had there been no diversions from the Edwards.

If diversions from the Edwards are allowed to increase, flows from the Comal and San Marcos springs will decrease even further, and flows in the Guadalupe River south of the Balcones Escarpment will cease during periods of extreme drought. The loss of natural river flow, even for brief periods of time, will result in severe environmental and economic damage to the Guadalupe River Basin, adjacent coastal basins, and the San Antonio Bay and Estuary which receive freshwater flows from the river system. Rights to divert water from the Guadalupe River issued by the State of Texas for municipal, industrial, irrigation, and other useful purposes are of no benefit when the river ceases to flow.

Conjunctive Regulation of the Edwards and Connected Surface Streams

The State of Texas, through the Texas Water Commission, regulates the use of all water owned by the state through a system of permits issued to water users with priority of use based on the doctrine of "first in time is first in right." Privately owned groundwater currently is not subject to regulation by the state and is available for use by landowners with only minor restrictions imposed through various groundwater districts. The Edwards is significantly different from other water-bearing formations in Texas — it is an underground stream. The waters flowing in the Edwards are owned by the state, and are already subject to regulation by the Texas Water Commission under the same regulatory system applicable to state-owned surface waters.

It is essential that uses of water from the Edwards be regulated in conjunction with regulation of the use of water from the Guadalupe River. The current use of water from the Edwards exceeds the availability of water during critical drought conditions, and has reduced spring flow so as to impair existing surface-water rights in the Guadalupe River. Left unregulated, diversions from the Edwards will continue to increase, causing even greater water shortages in the region during droughts. Such a shortage will cause severe damage to the environment and the economy of the region.

Regulation of the Edwards should begin with an adjudication of all claims of rights to divert water from the Edwards. To the extent that users may not now have sufficient rights to withdraw water from the Edwards, such rights could be granted by the Texas Water Commission or, perhaps, by the Legislature directly. Rights to use water from the Edwards would be a property right, as are all rights to use state-owned surface waters Such rights may be sold to other users and, if necessary, amended by the Texas Water Commission

Supplemental Sources of Water

To the extent that the Edwards cannot meet all current or future needs, water users will find it necessary to seek supplemental sources of water. Initially, conservation of water or the reduction of water requirements through efficiency of use may be the most economical means of responding to water shortages. To some extent, water rationing during periods of drought can be used to effect a reduction by major users such as municipalities and certain industries.

Reuse of water such as the application of treated wastewater for irrigation or for industrial cooling often is an effective method of reducing water requirements. Reduced freshwater demand through reuse may also provide significant cost savings to the region.

After water conservation methods and reuse of treated wastewater have been effectively applied, supplemental sources of water may be necessary to meet future requirements, and to promote and sustain a healthy economy. In the river basins that are crossed by the Edwards, a potential exists south of the Balcones Escarpment for the development of surface-water reservoirs. These potential reservoirs would store flood waters for use during periods of drought to provide additional water supplies to meet regional requirements that exceed the amounts available from the Edwards. These stored waters would also provide supplemental supplies for uses of water from the Guadalupe River and its tributaries during periods of drought.

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COMAL RIVER AT NEW BRAUNFELS
USGS GAGE 08169000
(ACRE-FEET)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	AVERAGE
1940	17540	16570	17580	17490	16410	18610	17620	16960	16440	16830	16280	20100	208430	17369
1941	18280	17380	20000	25030	28210	23300	22020	22190	20330	23060	20350	20570	260720	21727
1942	20780	18710	20610	20480	19440	18900	22550	19640	26510	27840	24120	25560	265140	22095
1943	25060	21660	23020	21180	20470	19970	20170	19570	19410	18860	18840	19280	247490	20624
1944	21550	19230	22740	22800	24680	22440	21830	20140	19800	19980	18680	21080	254940	21245
1945	22900	23050	26430	25690	25480	22370	21290	20980	19910	22390	19710	20640	270840	22570
1946	20100	17820	21120	19720	24310	26400	23020	22090	27170	24300	25620	24650	276320	23027
1947	25980	22610	25010	23420	24390	20550	20230	20120	19020	19190	18390	18990	257900	21492
1948	18730	17740	18260	17600	17490	16510	16410	15830	15360	15850	15530	15760	201070	16756
1949	15900	13830	16680	18840	19240	18880	19180	18820	17160	19250	16750	17490	212020	17668
1950	17460	15870	17170	16350	16590	16550	15700	15120	14720	15370	14330	14470	189700	15808
1951	14270	12490	13700	12890	13440	13130	11840	11150	10790	11290	11410	12460	148860	12405
1952	11830	10460	11160	11070	11250	10850	10020	8300	39470	11880	12070	14040	162400	13531
1953	14190	12600	13490	14540	12540	10590	8820	7840	11190	12060	12180	12630	142670	11889
1954	12680	11350	10580	8800	9220	7200	6470	5250	4670	6790	7390	7960	98360	8197
1955	8420	8000	7950	6310	6030	5550	4160	3390	3350	3700	4350	5610	66820	5568
1956	5650	5410	4340	2690	1950	682	740	946	891	768	1410	2520	27997	2333
1957	3170	2920	4800	19590	20510	17720	9740	5780	10610	14070	14320	15510	138740	11562
1958	17780	20170	20810	20140	21400	18590	18670	16270	19080	20410	19950	20810	234080	19507
1959	20590	18800	20580	20260	19940	17860	18530	17820	17050	19940	18430	19440	229240	19103
1960	19970	18800	20040	19810	19560	19950	18260	18470	17840	26300	20630	22060	241690	20141
1961	22270	20640	22320	20500	19720	19290	22390	19930	18620	21240	20960	20080	247960	20663
1962	19870	17530	18640	17840	17570	15940	14630	12350	13220	14700	14590	16500	193380	16115
1963	16410	14750	16090	14700	14360	11810	11000	8540	8720	10310	11530	12580	150800	12567
1964	13070	13240	13930	12730	11830	11930	9800	7880	8510	10540	12290	12810	138560	11547
1965	13050	16490	16900	16540	29570	19170	16230	13880	12410	16640	15770	22580	209230	17436
1966	18770	17330	18840	17300	18570	16060	14550	13110	14240	15260	14530	14870	193430	16119
1967	15040	12540	12940	11640	10050	6450	5730	5030	12780	13290	15380	15580	136450	11371
1968	30680	19950	21600	22250	22170	20240	19550	17920	17260	18440	17730	18960	246750	20563
1969	18770	17310	20050	19170	21220	18630	16260	13500	15260	16490	17030	18690	212380	17698
1970	18840	17600	21030	20050	24480	20900	18470	17000	15700	17750	17220	17610	226650	18888
1971	17020	13880	13900	11470	10210	7080	7430	12030	13720	16000	17440	19630	159810	13318
1972	19790	18340	16470	15500	57740	21280	19130	18770	17730	18870	19100	19830	264550	22046
1973	20090	18200	20850	22070	22530	24560	28230	24210	29480	30150	26760	26880	294010	24501
1974	26560	23720	24750	22600	25580	21460	20220	20120	21760	23010	28920	25120	283820	23652
1975	24560	24450	25320	24150	33600	26720	25160	23200	22080	22490	21490	22210	295430	24619
1976	21490	19210	19620	20670	29760	24170	23890	21570	21500	27470	24670	26090	280110	23343
1977	27250	24860	25160	31600	26960	24280	23240	21050	20300	20600	21940	22450	289690	24141
1978	21810	19410	20460	18990	18240	18640	14930	18930	20140	20960	23920	23450	239880	19990
1979	26530	23770	24860	24320	24650	25910	27230	26180	24100	22720	20570	21890	292730	24394
1980	22410	20080	19970	18100	19070	16860	12350	12810	14670	16360	16470	18090	207240	17270
1981	18540	16490	18100	17020	19060	25730	20840	19150	18740	19570	20560	20660	234460	19538
1982	20160	17630	18280	17320	22700	17870	15870	13870	12760	14080	14580	16280	201200	16767
1983	17100	14970	16470	15490	15160	14910	13760	13130	11420	12660	13160	13820	172050	14338
1984	13790	12610	12300	8700	6220	4670	2180	2240	2600	6880	9000	10310	91500	7625
1985	12870	12440	15000	15390	14800	15910	21470	13810	13010	16260	21570	20050	192580	16048
TOTAL	849570	772700	831920	820810	908370	797072	751810	696886	751501	792868	787920	828650	9590077	
AVG	18469	16798	18085	17844	19747	17328	16344	15150	16337	17236	17129	18014	208480	

SAN MARCOS RIVER SPRING FLOW AT SAN MARCOS
USGS GAGE 08170000
(ACRE-FEET)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	AVERAGE
1940	7502	6960	6825	6427	6210	5784	4630	6272	6189	6518	6724	6948	76989	6416
1941	8916	7773	9346	10562	15434	14460	14050	13159	9759	10023	9640	9654	132776	11065
1942	8424	7220	7741	7349	7740	7649	8363	8055	12437	13128	12972	10822	111900	9325
1943	9777	7498	8608	8271	8485	8093	7994	8301	7736	7686	6843	7040	96332	8028
1944	7010	9491	14573	12020	13774	14638	13097	11683	9342	9654	9283	9531	134096	11175
1945	10084	12662	14327	14995	14757	13567	11314	10023	9342	10392	8033	8547	138043	11504
1946	8670	9192	11683	10711	10146	10294	19838	19838	10711	12298	12496	14634	150511	12543
1947	14819	11996	13466	11842	11252	9937	9285	9408	9283	7748	8509	7871	125416	10451
1948	8240	6615	6979	6665	5792	4963	6210	6333	6129	6333	6248	5743	76250	6354
1949	6395	5009	6487	6546	10207	8212	7748	7563	6948	6702	7081	7563	86461	7205
1950	6333	6331	7317	6248	7071	6962	7256	6948	5802	5614	5334	5276	76492	6374
1951	6286	4693	5104	5326	4919	8271	6395	5995	5558	5497	5397	5177	68618	5718
1952	4870	4585	4988	5475	5399	6546	6456	5436	6438	7871	8122	8916	75102	6259
1953	9346	7775	8205	7557	8117	6902	6702	6272	8688	7748	8926	11621	97859	8155
1954	8977	6831	7563	7319	7010	6367	5872	4784	4832	5208	5183	5503	75449	6287
1955	5626	5195	5270	4635	5454	6081	5786	4925	4570	4513	4463	4630	61148	5096
1956	4550	4239	4114	4011	4120	3790	3350	3290	3520	3970	4180	4430	47564	3964
1957	4570	4020	5730	7920	12120	11480	9490	6340	7980	12250	13190	12980	110270	9189
1958	12150	12120	15980	13980	16510	14000	12070	10440	9780	11130	12880	12400	153440	12787
1959	10810	9720	10030	9940	10840	9650	9460	8710	8040	10010	9540	9300	116050	9671
1960	9070	9070	9480	9990	13390	12110	13040	12430	12020	11730	14210	14870	141410	11784
1961	14610	13630	14020	13150	12810	11470	11030	10660	9170	9510	8990	9210	138260	11522
1962	8740	7550	8200	7840	7960	6930	6590	6840	8410	10150	8380	8260	95850	7988
1963	7870	6910	7720	7570	7840	7480	6500	6070	5280	5030	5130	5310	78710	6559
1964	5180	4880	5490	5840	6190	6240	6300	5680	5550	6390	6160	6280	70180	5848
1965	6660	9670	10560	9820	11940	13180	12090	10830	9210	8930	8020	12110	123020	10252
1966	11720	9900	11240	10140	10490	9860	9430	8860	7960	7850	7000	6910	111360	9280
1967	6550	5440	6370	6510	6270	5670	5180	5170	6000	7260	8380	8850	77650	6471
1968	11960	15010	14630	13630	14470	13780	12990	10490	9610	9230	8500	8760	143060	11922
1969	8190	7400	9210	10310	12850	12710	11100	9910	9020	9360	8590	9170	117820	9818
1970	9600	9390	12340	12550	14910	15490	14140	12190	10880	11870	11020	10190	144570	12048
1971	9210	8010	8060	7420	7380	6640	6190	7130	6450	6640	7130	11590	91850	7654
1972	11560	10030	9680	9130	10350	10150	10290	9610	8790	6350	8830	9880	116650	9721
1973	9980	9940	12160	12280	12960	12950	14470	13620	11980	16130	16620	15110	158200	13183
1974	13040	10840	11090	10200	11620	10710	9680	9250	10220	10690	11860	14570	133770	11148
1975	13820	14640	14870	13280	16130	14730	16690	15050	12710	12520	11660	11090	167390	13949
1976	10380	9050	8780	8770	12490	15030	15280	13270	12450	13560	16730	17350	153140	12762
1977	16980	16280	17360	16280	16810	14650	13330	11930	10920	9830	8910	8270	161550	13463
1978	7620	6670	7190	6810	7280	7280	6520	6890	7520	7580	7510	8540	87410	7284
1979	10840	11440	14160	14330	15940	14010	12960	12980	10890	10090	8710	8600	144950	12079
1980	8460	7760	7800	6890	8320	8840	8370	8050	7890	8150	7470	7950	95950	7996
1981	7740	6950	7820	8000	8600	14680	17590	14690	12620	11770	10410	10130	131000	10917
1982	9480	7890	8150	7420	8480	7810	7880	7510	7220	7320	7010	7320	93490	7791
1983	7060	6620	8690	10060	10560	10750	9840	8660	8370	7900	8050	13820	110380	9198
1984	7910	6990	6960	6280	6100	5950	5260	4590	4290	5300	5880	6840	72350	6029
1985	8260	8290	10030	10050	9540	11560	14820	12430	10990	9960	10900	20050	136880	11407
TOTAL	415845	390175	436396	422349	467437	458306	452926	420565	389504	407393	407104	439616	5107616	
AVG	9074	8516	9546	9243	10249	10056	9962	9207	8518	8908	8897	9615	111792	

GUADALUPE RIVER AT NEW BRAUNFELS
USGS GAGE 08168500
(ACRE-FEET)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	AVERAGE
1940	4380	5950	8980	23320	15920	21090	13120	4710	2820	2920	15640	55490	174340	14528
1941	18410	77850	79610	109300	144500	51310	38180	18320	19120	32410	17390	14180	620580	51715
1942	12060	10330	9850	45160	52840	16210	13420	8510	48650	51170	27150	22620	317970	26498
1943	17580	11960	12660	14810	10820	21820	14740	5640	7890	6470	5170	6720	136280	11357
1944	18490	28060	54040	28960	121100	55620	20700	20370	25920	18800	14720	43360	450140	37512
1945	64500	63380	76830	63900	30450	18520	14440	8510	14860	27750	12320	25200	420660	35055
1946	20980	26520	36190	22270	37840	24750	9220	6410	30270	41540	71670	50540	378200	31517
1947	78760	48420	38120	31320	28000	29040	13080	10780	5400	4820	5400	6590	299730	24978
1948	5920	6260	6390	5550	6910	11420	7410	2160	2450	4090	3010	3740	65310	5443
1949	5110	21590	20600	33610	30370	14320	7490	9170	6670	9340	5920	6410	170600	14217
1950	6500	10750	7350	8330	13380	8490	6020	2050	2470	2160	2190	3110	72800	6067
1951	3150	3570	5570	5300	10990	9450	1110	343	657	472	1240	2520	44372	3698
1952	2380	1990	2520	8250	23230	13680	2690	670	183200	9570	7800	19380	275360	22947
1953	20350	9790	8790	8120	4630	1380	2140	1880	23900	12290	6870	10180	110320	9193
1954	5870	4180	3220	2210	6890	1500	423	372	227	803	1840	1360	28895	2408
1955	2210	3990	2210	1250	8540	2660	7260	2320	715	1090	704	1540	34489	2874
1956	1560	1800	1210	556	842	40	3	408	290	614	1250	1340	9913	826
1957	755	1960	19910	115700	65200	61150	10740	4620	27080	105700	57340	40330	510485	42540
1958	61070	79710	87550	44660	134600	50600	24020	12780	49570	37370	64100	27930	653960	54497
1959	22600	21320	21280	25090	18950	39480	20590	11150	7220	91970	19520	20040	319210	26601
1960	28680	25990	21600	22040	18190	17910	17440	60410	19370	112000	60690	70370	474690	39558
1961	64720	98980	60390	33530	20520	34640	22460	14080	9990	9750	11290	10900	391250	32604
1962	9680	7970	8170	9300	7900	11240	3230	1070	5060	5700	6280	8100	83700	6975
1963	6140	5860	5770	11230	5840	2870	1780	1430	951	2400	5080	4180	53531	4461
1964	4380	10000	14500	8190	4850	7140	2480	2680	9650	25400	21740	8160	119170	9931
1965	8570	12860	19020	13530	29920	22910	21150	8880	14160	12640	13630	17770	195040	16253
1966	21700	23140	26440	24270	16660	23710	20060	14100	21560	21190	13920	7630	234380	19532
1967	7620	6040	7500	6620	5890	3150	4020	5740	19780	29730	36170	21680	153940	12828
1968	29480	18770	35490	48500	60600	44350	22060	13520	10120	8980	8050	10110	310030	25836
1969	10090	17120	19400	21890	36600	27160	12130	9230	9700	46280	34470	33780	277850	23154
1970	53910	39610	53060	51850	33650	58590	28610	13290	9120	9830	8660	9140	369320	30777
1971	8760	6780	6020	3420	3650	3460	3650	73650	52540	47660	55380	52820	317790	26483
1972	34320	47210	21820	14560	96010	53110	43500	32210	18160	14650	9470	10960	395980	32998
1973	16720	21460	32210	36340	41980	28900	135800	68370	42400	76020	77780	50060	628040	52337
1974	34300	30340	25860	16400	40510	28220	11090	9490	44000	26490	61820	34380	362900	30242
1975	45220	120900	60140	42780	72720	141600	61660	46990	27220	10830	6410	4770	641240	53437
1976	11700	10940	11530	25020	50160	43690	40600	49130	30190	27830	37580	46140	384510	32043
1977	50830	47910	51350	128800	112100	57210	46840	16870	10640	12750	16070	9970	561340	46778
1978	8990	8090	8580	8240	7650	7820	7070	237700	88210	48320	27450	13410	471530	39294
1979	53930	79360	110200	88890	105200	109000	60950	48460	22410	10960	8690	8620	706670	58889
1980	7930	9250	12670	12080	18890	22900	10510	4950	18280	26640	17250	16240	177430	14786
1981	14560	17340	37880	50240	51570	169000	88520	58890	28830	43920	51430	44710	656890	54741
1982	20610	15240	16530	14430	38960	27700	14140	7030	5820	5800	6040	7010	179310	14943
1983	11250	15770	21130	29200	16320	21310	19810	12370	6250	5990	12310	5740	177650	14804
1984	5760	7490	6380	4810	4070	2820	1530	2480	2290	8310	17540	18550	82030	6836
1985	61130	41710	60100	50680	34370	43790	61160	28470	13830	59180	65940	57780	578140	48178
TOTAL	1003615	1185550	1256620	1374506	1700782	1466730	989046	972663	999910	1170599	1012384	945560	14077965	
AVG	21818	25773	27318	29881	36974	31885	21501	21145	21737	25448	22008	20556	306043	

SAN MARCOS RIVER AT LULING
USGS GAGE 08172000
(ACRE-FEET)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	AVERAGE
1940	5790	6070	7300	11390	7920	37140	11720	5950	5980	7610	29420	64710	201000	16750
1941	23640	42850	52270	92240	88850	64320	32970	16950	12810	19630	11550	11410	469490	39124
1942	10660	8510	9310	22370	13070	9960	60050	10730	80810	54920	26600	21160	328150	27346
1943	17960	14100	15510	14780	14200	12510	12930	8530	11960	8680	9090	9090	149340	12445
1944	19030	25650	52140	26240	54540	37010	18620	17500	16190	12380	18080	38560	335940	27995
1945	48150	49810	68990	51590	22050	17890	14560	11590	10040	12130	10210	12710	329720	27477
1946	19550	24300	41120	22140	20640	21130	11500	18740	31810	19440	55710	43540	329620	27468
1947	54680	30480	27850	26780	22600	13810	11800	26810	9650	9040	8060	8520	250080	20840
1948	8190	8130	8260	6950	12040	6520	6760	5650	5490	9310	5810	5870	88980	7415
1949	6720	19540	9630	70110	23070	11370	8620	7300	6980	45950	7360	7680	224290	18691
1950	7530	10640	8270	17630	11580	28880	7290	6110	6220	5530	5480	5270	120430	10036
1951	5260	5110	5700	5200	6790	26380	5640	4820	6260	4900	4980	5210	86250	7188
1952	5190	4660	5310	6300	17460	13130	7080	5450	93820	10630	16340	18650	204020	17002
1953	18060	11750	10490	38110	12760	8980	6480	6280	21690	16600	12970	21320	186290	15524
1954	11360	8960	9400	7740	12410	5440	4870	4580	4280	4340	4570	5050	83000	6917
1955	4850	8640	5880	5520	16360	10170	4980	4850	4190	3670	3750	5120	78180	6515
1956	4910	4690	4540	4670	7110	3480	3620	3950	4960	4460	4190	5780	56360	4697
1957	4760	6710	17680	110000	61600	53080	13000	10020	39500	57370	46000	33720	453440	37787
1958	41570	93450	54860	33780	98370	32270	18490	12870	28750	28200	32980	22050	497640	41470
1959	18210	20520	18820	39460	23050	17990	13920	12350	9590	47030	19440	16630	257010	21418
1960	23880	25700	20220	46980	21160	74570	19110	16420	12760	91110	46430	51850	450190	37516
1961	47880	73310	38070	24480	17500	56930	23290	14760	12640	12840	20060	12510	354270	29523
1962	11440	9470	10090	10480	8840	15080	8370	6950	13810	12710	8590	11070	126900	10575
1963	9960	11860	9440	11350	8930	6520	5960	5310	5110	5190	6740	6050	92420	7702
1964	6510	6290	9220	6720	6330	9120	5990	5630	9210	7760	11870	7440	92090	7674
1965	22620	64580	25110	29010	90110	67870	19110	13270	12070	16350	16080	51720	427900	35658
1966	24460	24680	24810	24220	27060	16950	11980	10540	12290	13330	8980	8770	208070	17339
1967	8210	7010	7710	6720	6680	4970	4830	5150	25920	12710	32340	14020	136270	11356
1968	140600	42400	34580	48200	40030	29210	18250	13120	12950	11390	14360	21250	426340	35528
1969	11880	24240	25690	34010	46910	25280	15220	12250	11210	13000	11590	20310	251590	20966
1970	16810	25070	43360	26270	93070	42010	22340	17110	13940	18020	12500	11510	342010	28501
1971	10450	8580	8420	7270	7070	5810	5410	8270	9590	8280	10860	24040	114050	9504
1972	16340	12610	11440	9470	105800	27230	15150	12890	9540	11450	13770	12690	258380	21532
1973	17980	25780	34590	41970	28630	64980	73950	30650	31620	119300	44330	28090	541870	45156
1974	28340	19480	18440	15620	25740	16040	10270	15880	44050	17630	83520	37720	332730	27728
1975	29740	64860	30090	24760	126300	75180	45250	28310	18780	18690	15820	15260	493040	41087
1976	13540	11440	12330	58170	90110	52310	41820	24090	18790	61870	57370	53770	495610	41301
1977	46040	52340	36480	110200	52290	29990	19690	14020	12220	12770	13660	11850	411550	34296
1978	11600	10890	10660	9110	8650	11020	6490	7070	11230	8940	17180	14490	127330	10611
1979	43710	39180	62250	78390	60680	31380	25500	21340	15370	13040	11930	12440	415210	34601
1980	11410	10300	10620	9770	22540	11930	8490	7610	15590	12610	11150	11730	143750	11979
1981	12120	10910	19280	14660	13950	183800	47820	31450	24430	45780	39990	15240	459430	38286
1982	13630	11410	11830	10270	53280	15340	10160	8290	7060	7030	7290	8250	163840	13653
1983	9040	11080	23740	17160	27590	36010	16980	12030	11870	11640	10960	9430	197530	16461
1984	9269	8520	8170	6130	5490	4980	4210	3920	3830	6970	6760	10680	78929	6577
1985	30620	23750	34620	22960	24010	92090	47430	17240	13820	18720	58940	46520	430720	35893
TOTAL	964949	1040310	1014590	1317350	1565220	1438060	807970	564600	800640	970950	925660	890950	12301249	
AVG	21315	22983	22384	29021	34607	31132	17694	12414	17659	21408	19916	18361	268894	

PLUM CREEK NEAR LULING
USGS GAGE 08173000
(ACRE-FEET)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	AVERAGE
1940	273	410	480	1860	506	11850	9520	172	145	1040	19780	32730	78764	6564
1941	7450	8000	11410	47020	25040	22140	8470	1350	481	1520	528	619	134028	11169
1942	554	624	545	3430	447	246	44510	374	23400	13670	3660	4140	95600	7967
1943	2700	748	1430	859	2130	600	2260	132	502	233	467	370	12431	1036
1944	7360	9000	15630	1080	19070	10450	1070	2470	4430	302	10280	19270	100412	8368
1945	19210	11150	11140	22240	2850	6560	646	485	407	933	609	777	77007	6417
1946	6350	5830	35560	6120	12800	9720	746	14610	12750	3230	28760	9800	146276	12190
1947	21780	2340	6520	8790	3610	697	504	33110	619	432	412	541	79355	6613
1948	671	734	582	478	4700	821	355	166	91	397	160	196	9371	781
1949	818	11470	646	37680	1970	593	577	174	74	21470	377	454	76303	6359
1950	401	1680	401	9040	2600	32490	2160	91	155	71	121	163	49373	4114
1951	227	200	516	260	1350	25220	69	17	1170	55	100	209	29393	2449
1952	290	209	228	1110	1850	6140	302	3	4100	33	12730	4660	31655	2638
1953	799	604	418	39360	1810	464	174	42	1590	7560	1170	4870	58861	4905
1954	656	254	180	186	1630	75	310	79	75	33	12	37	3527	294
1955	63	2670	112	1400	4160	2090	8	272	39	8	38	169	11029	919
1956	113	254	64	2470	2140	17	0	0	0	0	0	363	5421	452
1957	49	749	5300	51400	3330	3340	52	7	28890	25620	9240	4680	132657	11055
1958	13350	27300	2780	2300	8350	314	1460	54	8370	4620	2820	793	72511	6043
1959	940	7160	1050	14740	2650	1210	403	181	132	8930	4000	1170	42566	3547
1960	3630	4210	1620	45280	4350	25160	972	2810	749	78730	6700	9910	184121	15343
1961	12590	13380	1810	984	489	57740	2730	443	5860	1050	6020	1070	104166	8681
1962	1120	943	1030	1500	398	1970	300	34	2550	4080	560	3350	17835	1486
1963	526	5400	551	2110	406	142	44	167	213	55	666	202	10482	874
1964	295	454	2340	395	136	3590	50	51	12850	1800	2660	312	24933	2078
1965	28270	41260	2460	2320	41240	14430	407	132	105	800	6190	26850	164464	13705
1966	1410	7720	5080	3140	4580	810	380	312	971	3200	387	443	28433	2369
1967	385	317	276	190	1280	93	54	109	12910	11410	18990	1450	47464	3955
1968	56980	5340	3100	22790	8570	23810	2270	354	1120	1180	7200	22620	155334	12945
1969	1900	21390	18400	21200	20070	2130	435	322	676	755	1550	7280	96108	8009
1970	2570	13780	15610	5440	33000	3800	644	321	732	7730	1010	566	85203	7100
1971	623	631	1030	335	255	171	115	4290	667	221	298	3220	11856	988
1972	642	506	287	152	36980	3600	250	205	161	243	557	404	43987	3666
1973	1830	4280	9320	8240	1190	24850	4600	229	1990	55640	4690	1240	118099	9842
1974	12310	2040	938	547	12330	3680	194	13000	24740	1900	57490	20430	149599	12467
1975	4690	23280	2000	5120	118200	29090	8580	1530	693	4600	958	1720	200461	16705
1976	1660	1130	1020	66040	66200	22270	3500	708	765	38960	27550	20070	249873	20823
1977	9710	21350	3300	57180	5890	7210	1180	631	707	1060	879	760	109857	9155
1978	875	1230	1350	754	517	8610	256	352	637	280	5910	1680	22451	1871
1979	17920	14150	11530	12340	14320	2860	2470	663	457	360	458	693	78221	6518
1980	758	614	677	513	18090	854	130	119	3540	1090	620	448	27453	2288
1981	874	767	1530	1120	1480	62880	5910	631	472	6440	7000	588	89692	7474
1982	772	869	775	1680	38550	952	487	131	300	304	551	468	45839	3820
1983	1220	6770	16900	2750	17580	4970	733	257	996	629	2420	706	55931	4661
1984	1240	1250	904	418	266	451	188	139	69	3650	371	1020	9966	831
1985	3420	1240	3940	9240	6780	17040	17160	570	1100	1060	61910	14290	137750	11479
TOTAL	252274	285687	202770	523601	556140	458200	127635	82319	163450	317384	318859	227801	3516120	
AVG	5484	6211	4408	11383	12090	9961	2775	1790	3553	6900	6932	4952	76437	

GUADALUPE RIVER AT VICTORIA
USGS GAGE 08176500
(ACRE-FEET)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	AVERAGE
1940	31560	41610	38860	57860	45810	66080	407800	32220	27390	38690	380600	348800	1517280	126440
1941	158000	220100	270400	280900	798600	284600	155000	86680	69240	83570	71090	57450	2535630	211303
1942	53150	44670	48770	155800	98240	54530	386700	57300	260700	170500	105200	89550	1525110	127093
1943	86780	61570	69530	61440	55690	82530	57750	41190	44960	40460	38740	45020	685660	57138
1944	82180	94630	182500	90370	209000	181200	74290	54930	104500	53040	74960	131000	1332600	111050
1945	198900	180900	169800	331500	93540	79540	56520	43590	38430	77990	47730	63730	1382170	115181
1946	77710	102500	189700	91740	127100	139700	49660	64260	287700	254400	218100	137800	1740370	145031
1947	220600	118900	133000	130000	132800	69420	55790	83070	41240	35860	37940	44250	1102870	91906
1948	41160	47400	47240	32860	86920	33380	45760	33690	23520	28650	23600	26240	470420	39202
1949	30010	55580	96340	244000	170200	67270	54910	40620	34220	167900	50820	60920	1072790	89399
1950	43500	49980	41510	76460	55990	139200	36140	22650	22680	21800	21040	25120	556070	46339
1951	24170	23530	26280	27090	34690	135600	19060	11430	22340	14640	18720	20050	377600	31467
1952	20680	23080	20570	35110	83010	80640	29000	11090	237600	43450	57310	115900	757440	63120
1953	101600	46310	40000	43490	156900	20020	19630	29820	103000	103500	41210	54460	759940	63328
1954	35770	28050	25370	28770	43170	14650	9010	6630	6380	7460	11930	14850	232040	19337
1955	15900	52760	20230	17270	47400	47440	13160	12960	9400	6150	6360	11230	260260	21688
1956	11970	14680	9720	9350	13800	3550	3310	2310	3070	10070	3550	29890	115270	9606
1957	7270	22780	71660	246800	427600	316100	41590	21850	229600	488500	250500	122300	2246550	187213
1958	250300	480100	241200	119900	264000	105000	76720	45680	119800	113900	132600	89180	2038380	169865
1959	78150	109200	80030	196600	103000	67380	79300	50770	43980	154000	77320	68510	1108240	92353
1960	87990	86780	74020	77380	147100	169900	162000	111000	64920	566700	461800	202200	2211790	184316
1961	235700	257700	151200	96320	70780	407900	162100	72230	113100	63640	133000	61280	1824950	152079
1962	55700	50120	48020	56210	45860	52400	31440	20410	43790	40050	40890	49470	534360	44530
1963	42880	57950	40780	43920	30090	21900	18680	10600	11940	13120	46140	29120	367120	30593
1964	27690	46450	73670	40350	27470	33250	15970	16690	42630	51260	57460	32350	465240	38770
1965	98290	263000	78170	72570	266000	239100	68630	42950	42060	78420	117100	161100	1527390	127283
1966	75930	92710	97690	122000	160300	71420	54900	39370	51730	53990	41860	36660	898560	74880
1967	36660	30040	31510	28210	24130	16680	12840	18590	555500	139600	131700	68470	1093930	91161
1968	438400	135100	114900	173000	306900	367600	102600	59130	98120	51520	56130	125900	2029300	169108
1969	57400	184700	183400	218500	200100	91360	52990	43560	50070	83180	72860	94210	1332330	111028
1970	110500	103500	173000	114300	211100	164100	74060	52430	47460	64670	43480	42730	1201330	100111
1971	41250	34020	35860	25570	22570	22480	19840	96540	173400	89350	86180	124600	771660	64305
1972	88900	91060	64940	45000	752000	166000	101300	82570	57800	57370	52270	51450	1610660	134222
1973	69380	90780	155600	307900	138500	446900	263000	167300	130300	648600	202100	131800	2752160	229347
1974	224300	105100	89950	70870	136000	102500	52980	61020	233700	87450	278800	175100	1617770	134814
1975	129100	256100	138300	132900	544200	383300	203400	122700	86920	71010	58980	71910	2198820	183235
1976	57200	50610	56110	301600	389800	199100	139900	104900	95230	249000	303600	417300	2364350	197029
1977	183000	262500	140800	613900	285600	152700	107100	71880	62980	57130	92880	57720	2088190	174016
1978	56670	56280	56330	57810	47690	85720	38370	229000	222500	94410	111700	63180	1119660	93305
1979	293100	217200	235400	310800	467400	349000	140600	122200	100000	56800	51170	50470	2394140	199512
1980	66040	53560	48930	43600	164400	65860	37100	27100	75410	58350	49120	50970	740440	61703
1981	52140	50730	77680	99140	131900	596300	235700	115300	674700	133900	261700	104700	2533890	211158
1982	77320	91160	66430	57460	333700	80010	47400	30650	28530	36790	61360	41860	952670	79389
1983	43500	84720	132300	81800	89610	75630	81470	39410	45240	43190	53070	32370	802310	66859
1984	46010	37910	47370	27140	22590	17290	6850	6440	7440	38710	40070	53550	351370	29281
1985	124700	86880	143100	152900	98060	159700	154600	62840	42970	100400	209300	198000	1533450	127788
TOTAL	4389110	4694990	4378170	5648460	8161310	6525930	4056920	2579550	4888190	4943140	4784040	4084720	59134530	
AVG	96834	103408	96429	124236	180344	143552	81092	56607	108018	108988	97854	83020	1280383	

TOTAL COMBINED SPRING FLOW
COMAL RIVER (USGS GAGE 08169000)
PLUS SAN MARCOS SPRING FLOW (USGS GAGE 08170000)
(ACRE-FEET)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	AVERAGE
1940	25042	23530	24405	23917	22620	24394	22250	23232	22629	23348	23004	27048	285419	23785
1941	27196	25153	29346	35592	43644	37760	36070	35349	30089	33083	29990	30224	393496	32791
1942	29204	25930	28351	27829	27180	26549	30913	27695	38947	40968	37092	36382	377040	31420
1943	34837	29158	31628	29451	28955	28063	28164	27871	27146	26546	25683	26320	343822	28652
1944	28560	28711	37113	34820	38454	37078	34927	31823	29142	29634	27963	30611	389036	32420
1945	32984	35712	40757	40685	40237	35937	32604	31003	29252	32782	27743	29187	408883	34074
1946	28770	27012	32803	30431	34456	36694	42858	41928	37881	36598	38116	39284	426833	35569
1947	40799	34606	38476	35262	35642	30487	29515	29528	28303	26938	26899	26861	383316	31943
1948	26970	24355	25239	24265	23282	21473	22620	22163	21489	22183	21778	21503	277320	23110
1949	22295	18839	23167	25386	29447	27092	26928	26383	24108	25952	23831	25053	298481	24873
1950	23793	22201	24487	22598	23661	23512	22956	22068	20522	20984	19664	19746	266192	22183
1951	20556	17183	18804	18216	18359	21401	18235	17145	16348	16787	16807	17637	217478	18123
1952	16700	15045	16148	16545	16649	17396	16476	13736	45908	19751	20192	22956	237502	19792
1953	23536	20375	21695	22097	20657	17492	15522	14112	19878	19808	21106	24251	240529	20044
1954	21657	18181	18143	16119	16230	13567	12342	10034	9502	11998	12573	13463	173809	14484
1955	14046	13195	13220	10945	11484	11631	9946	8315	7920	8213	8813	10240	127968	10664
1956	10200	9649	8454	6701	6070	4472	4090	4236	4411	4738	5590	6950	75561	6297
1957	7740	6940	10530	27510	32830	29200	19230	14120	18590	26320	27510	28490	249010	20751
1958	29930	32290	36790	34120	37910	32590	30740	26710	28860	31540	32830	33210	387520	32293
1959	31400	28520	30610	30200	30780	27510	27990	26530	25090	29950	27970	28740	345290	28774
1960	29040	27870	29520	29800	32950	32060	31300	30900	29860	38030	34840	36930	383100	31925
1961	36880	34270	36340	33650	32530	30760	33420	30590	27790	30750	29950	29290	386220	32185
1962	28610	25080	26840	25680	25530	22870	21220	19190	21630	24850	22970	24760	289230	24103
1963	24280	21660	23810	22270	22200	19290	17500	14610	14000	15340	16660	17890	229510	19126
1964	18250	18120	19420	18570	18020	18170	16100	13560	14060	16930	18450	19090	208740	17395
1965	19710	26160	27460	26360	41510	32350	28320	24710	21620	25570	23790	34690	332250	27688
1966	30490	27230	30080	27440	29060	25920	23980	21970	22200	23110	21530	21780	304790	25399
1967	21590	17980	19310	18150	16320	12120	10910	10200	18780	20550	23760	24430	214100	17842
1968	42640	34960	36230	35880	36640	34020	32540	28410	26870	27670	26230	27720	389810	32484
1969	26960	24710	29260	29480	34070	31340	27360	23410	24280	25850	25620	27860	330200	27517
1970	28440	26990	33370	32600	39390	36390	32610	29190	26580	29620	28240	27800	371220	30935
1971	26230	21890	21960	18890	17590	13720	13620	19160	20170	22640	24570	31220	251660	20972
1972	31350	28370	28150	24630	68090	31430	29420	28380	26520	27220	27930	29710	381200	31767
1973	30070	28140	33010	34350	35490	37510	42700	37830	41460	46280	43380	41990	452210	37684
1974	39600	34560	35840	32800	37200	32170	29900	29370	31980	33700	40780	39690	417590	34799
1975	38380	39090	40190	37430	49930	41450	41850	38250	34790	35010	33150	33300	462820	38568
1976	31870	28260	28400	29440	42250	39200	39170	34840	33950	41030	41400	43440	433250	36104
1977	44230	41140	42520	47880	43770	38930	36570	32980	31220	30430	30850	30720	451240	37603
1978	29430	26080	27650	25800	25520	25920	21450	25820	27660	28540	31430	31990	327290	27274
1979	37370	35210	39020	38650	40590	39920	40190	39160	34990	32810	29280	30490	437680	36473
1980	30870	27840	27770	24990	27390	25700	20720	20860	22560	24510	23940	26040	303190	25266
1981	26280	23440	25920	25020	27660	40410	38430	33840	31360	31340	30970	30790	365460	30455
1982	29640	25320	26430	24740	31180	25680	23750	21380	19980	21400	21590	23600	294690	24558
1983	24160	21590	25160	25550	25720	25660	23600	21790	19790	20560	21210	27640	282430	23536
1984	21700	19600	19260	14980	12320	10620	7440	6830	6890	12180	14880	17150	163850	13654
1985	21130	20730	25030	25440	24340	27470	36290	26240	24000	26220	32470	40100	329460	27455
TOTAL	1265415	1162875	1268316	1243159	1375807	1255378	1204736	1117451	1141005	1200261	1195024	1268266	14697693	
AVG	27509	25280	27572	27025	29909	27291	26190	24292	24804	26093	25979	27571	319515	

PERCENT OF TOTAL SPRING FLOW TO STREAM FLOW AT THE GUADALUPE-SAN MARCOS CONFLUENCE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	% TOT
1940	85.6%	75.5%	64.1%	36.8%	47.6%	22.3%	36.0%	78.6%	85.5%	77.4%	23.1%	12.2%	36.2%
1941	33.4%	13.3%	14.0%	10.1%	11.8%	18.7%	29.0%	52.5%	49.2%	35.8%	52.4%	57.1%	21.1%
1942	59.0%	60.7%	63.4%	24.4%	25.2%	50.8%	17.8%	63.8%	17.3%	22.3%	38.2%	42.1%	30.9%
1943	47.6%	52.6%	52.8%	49.5%	53.5%	43.3%	48.7%	77.1%	61.4%	71.6%	70.7%	67.9%	55.7%
1944	36.1%	28.7%	20.6%	36.8%	13.6%	23.7%	48.4%	45.0%	36.6%	49.7%	38.3%	20.0%	27.7%
1945	16.8%	19.2%	17.6%	19.8%	42.1%	47.5%	56.6%	68.2%	57.1%	43.9%	57.3%	41.4%	30.5%
1946	35.9%	29.8%	19.7%	36.2%	29.5%	37.6%	93.5%	61.4%	30.7%	34.0%	16.5%	24.7%	31.1%
1947	17.8%	26.9%	32.5%	32.3%	38.0%	39.8%	57.3%	26.9%	76.4%	75.2%	78.4%	71.6%	36.1%
1948	75.0%	67.6%	69.2%	73.7%	49.5%	53.2%	66.4%	90.4%	88.9%	68.9%	85.1%	79.3%	70.0%
1949	72.3%	22.9%	40.9%	12.5%	32.5%	52.3%	68.7%	67.7%	72.1%	22.1%	72.5%	72.3%	36.8%
1950	68.3%	49.5%	67.2%	37.3%	46.1%	22.3%	67.3%	92.2%	83.1%	87.6%	85.3%	81.4%	54.6%
1951	86.1%	75.0%	67.3%	70.8%	48.6%	23.7%	96.6%	106.3%	83.1%	100.3%	92.8%	82.3%	64.0%
1952	80.3%	82.8%	79.4%	54.3%	24.9%	33.0%	77.0%	93.5%	11.0%	53.9%	34.8%	33.6%	28.7%
1953	36.2%	51.1%	58.1%	17.9%	58.3%	77.1%	84.2%	84.1%	27.7%	34.1%	56.5%	42.4%	41.2%
1954	64.2%	67.2%	72.0%	80.7%	46.6%	93.3%	102.6%	96.6%	103.3%	99.7%	87.6%	90.9%	76.2%
1955	86.8%	49.6%	76.8%	70.0%	26.8%	49.9%	52.4%	70.6%	93.5%	95.0%	98.8%	75.9%	60.4%
1956	78.6%	73.9%	78.5%	58.2%	43.8%	107.8%	92.1%	74.9%	66.1%	76.2%	76.2%	63.1%	70.2%
1957	85.1%	49.2%	17.4%	7.1%	17.2%	17.0%	49.7%	62.2%	13.9%	10.0%	17.1%	24.3%	15.9%
1958	17.6%	11.4%	17.4%	27.4%	11.1%	25.7%	41.4%	56.1%	21.7%	28.3%	26.6%	38.9%	21.2%
1959	42.7%	35.1%	42.0%	24.7%	40.4%	29.1%	44.6%	56.6%	67.3%	13.8%	38.3%	42.6%	33.7%
1960	31.4%	30.7%	39.1%	17.9%	44.6%	18.9%	48.5%	25.0%	50.9%	9.6%	20.6%	18.9%	22.8%
1961	19.9%	12.9%	23.7%	35.1%	48.1%	14.5%	39.8%	54.7%	51.8%	61.6%	44.3%	58.5%	28.8%
1962	60.9%	63.0%	64.0%	58.5%	67.0%	44.4%	74.8%	92.0%	55.6%	60.1%	70.3%	56.4%	61.8%
1963	67.1%	50.2%	68.5%	49.0%	68.9%	86.9%	90.6%	92.3%	91.1%	81.0%	62.5%	71.9%	68.5%
1964	69.1%	52.7%	41.0%	58.8%	71.8%	49.9%	83.9%	78.5%	28.8%	30.1%	31.1%	59.1%	48.1%
1965	22.2%	15.6%	36.2%	36.2%	17.5%	21.1%	42.1%	61.3%	48.0%	47.6%	38.9%	23.9%	27.5%
1966	38.7%	30.8%	33.1%	22.9%	36.6%	37.6%	43.2%	49.9%	37.7%	36.3%	49.1%	61.7%	38.5%
1967	62.1%	62.5%	60.8%	65.2%	61.2%	77.2%	67.8%	55.8%	21.2%	24.6%	18.4%	38.8%	37.9%
1968	13.2%	33.9%	31.5%	20.3%	22.3%	23.3%	44.7%	55.7%	57.6%	62.3%	48.3%	31.8%	28.1%
1969	56.0%	25.3%	28.9%	25.0%	22.0%	35.6%	54.7%	59.1%	58.6%	27.0%	32.3%	28.3%	32.6%
1970	24.6%	22.5%	20.0%	25.2%	17.2%	23.2%	39.0%	53.7%	60.3%	48.4%	65.0%	64.8%	29.7%
1971	64.3%	66.7%	68.4%	79.2%	77.9%	77.7%	76.4%	14.9%	20.6%	24.9%	23.1%	25.1%	34.2%
1972	36.5%	29.0%	46.1%	54.2%	18.3%	23.9%	30.6%	36.6%	50.2%	52.5%	58.0%	60.6%	32.6%
1973	45.6%	33.6%	27.8%	25.7%	30.7%	21.2%	13.6%	24.4%	32.4%	13.0%	22.5%	32.4%	23.0%
1974	32.3%	38.2%	43.5%	51.9%	29.2%	38.8%	64.6%	43.3%	19.0%	41.2%	13.9%	27.6%	30.5%
1975	30.1%	13.0%	27.6%	31.7%	11.2%	11.7%	23.9%	31.2%	42.8%	54.8%	64.2%	70.1%	22.8%
1976	58.7%	58.9%	56.5%	13.8%	14.2%	22.2%	29.2%	29.6%	40.0%	21.3%	22.8%	24.1%	25.0%
1977	26.9%	22.6%	29.8%	11.4%	17.3%	26.4%	32.9%	55.1%	64.3%	57.1%	51.1%	61.3%	26.6%
1978	61.1%	58.8%	60.4%	62.7%	66.2%	49.2%	68.0%	7.3%	17.8%	29.2%	35.1%	52.9%	30.8%
1979	21.0%	17.7%	14.5%	14.8%	15.5%	18.4%	27.9%	33.2%	48.3%	62.8%	63.6%	63.1%	23.4%
1980	66.2%	62.2%	56.0%	54.2%	28.7%	41.1%	58.2%	76.4%	36.2%	35.7%	44.8%	48.2%	46.9%
1981	49.4%	43.8%	27.2%	23.9%	25.6%	7.0%	18.5%	24.5%	36.0%	21.7%	20.7%	30.8%	20.1%
1982	45.9%	48.6%	48.0%	48.9%	16.2%	34.2%	50.6%	66.2%	70.8%	72.7%	69.6%	67.2%	42.5%
1983	55.1%	37.3%	26.2%	32.5%	27.6%	27.2%	38.6%	50.0%	57.8%	59.6%	47.0%	89.7%	39.6%
1984	65.7%	58.4%	62.5%	68.1%	70.3%	76.7%	88.1%	71.3%	72.1%	39.9%	36.5%	34.9%	54.8%
1985	15.2%	20.7%	17.2%	20.5%	24.5%	12.8%	19.6%	36.1%	49.8%	21.7%	12.2%	23.2%	19.5%
% TOT	34.3%	29.0%	31.6%	25.0%	23.4%	24.4%	37.7%	40.5%	34.9%	30.3%	32.5%	36.7%	30.6%

PERCENT OF TOTAL SPRING FLOW TO STREAM FLOW AT THE GUADALUPE-SAN MARCOS CONFLUENCE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	% TOT
1940	85.6%	75.5%	64.1%	36.8%	47.6%	22.3%	36.0%	78.6%	85.5%	77.4%	23.1%	12.2%	36.2%
1941	33.4%	13.3%	14.0%	10.1%	11.8%	18.7%	29.0%	52.5%	49.2%	35.8%	52.4%	57.1%	21.1%
1942	59.0%	60.7%	63.4%	24.4%	25.2%	50.8%	17.8%	63.8%	17.3%	22.3%	38.2%	42.1%	30.9%
1943	47.6%	52.8%	52.8%	49.5%	53.5%	43.3%	48.7%	77.1%	61.4%	71.6%	70.7%	67.9%	55.7%
1944	36.1%	28.7%	20.6%	36.8%	13.6%	23.7%	48.4%	45.0%	36.6%	49.7%	38.3%	20.0%	27.7%
1945	16.8%	19.2%	17.6%	19.8%	42.1%	47.5%	56.6%	68.2%	57.1%	43.9%	57.3%	41.4%	30.5%
1946	35.9%	29.8%	19.7%	36.2%	29.5%	37.6%	93.5%	61.4%	30.7%	34.0%	16.5%	24.7%	31.1%
1947	17.8%	26.9%	32.5%	32.3%	38.0%	39.8%	57.3%	26.9%	76.4%	75.2%	78.4%	71.6%	36.1%
1948	75.0%	67.8%	69.2%	73.7%	49.5%	53.2%	66.4%	90.4%	88.9%	68.9%	85.1%	79.3%	70.0%
1949	72.3%	22.9%	40.9%	12.5%	32.5%	52.3%	68.7%	67.7%	72.1%	22.1%	72.5%	72.3%	36.8%
1950	68.3%	49.5%	67.2%	37.3%	46.1%	22.3%	67.3%	92.2%	83.1%	87.6%	85.3%	81.4%	54.6%
1951	86.1%	75.0%	67.3%	70.8%	48.6%	23.7%	96.6%	106.3%	83.1%	100.3%	92.8%	82.3%	64.0%
1952	80.3%	82.8%	79.4%	54.3%	24.9%	33.0%	77.0%	93.5%	11.0%	53.9%	34.8%	33.6%	28.7%
1953	36.2%	51.1%	58.1%	17.9%	58.3%	77.1%	84.2%	84.1%	27.7%	34.1%	56.5%	42.4%	41.2%
1954	64.2%	67.2%	72.0%	80.7%	46.6%	93.3%	102.6%	96.6%	103.3%	99.7%	87.6%	90.9%	76.2%
1955	86.8%	49.6%	76.8%	70.0%	26.8%	49.9%	52.4%	70.6%	93.5%	95.0%	98.8%	75.9%	60.4%
1956	78.6%	73.9%	78.5%	58.2%	43.8%	107.8%	92.1%	74.9%	66.1%	76.2%	76.2%	63.1%	70.2%
1957	85.1%	49.2%	17.4%	7.1%	17.2%	17.0%	49.7%	62.2%	13.9%	10.0%	17.1%	24.3%	15.9%
1958	17.6%	11.4%	17.4%	27.4%	11.1%	25.7%	41.4%	56.1%	21.7%	28.3%	26.6%	38.9%	21.2%
1959	42.7%	35.1%	42.0%	24.7%	40.4%	29.1%	44.6%	56.6%	67.3%	13.8%	38.3%	42.6%	33.7%
1960	31.4%	30.7%	39.1%	17.9%	44.6%	18.9%	48.5%	25.0%	50.9%	9.6%	20.6%	18.9%	22.8%
1961	19.9%	12.9%	23.7%	35.1%	48.1%	14.5%	39.8%	54.7%	51.8%	61.6%	44.3%	58.5%	28.8%
1962	60.9%	63.0%	64.0%	58.5%	67.0%	44.4%	74.8%	92.0%	55.6%	60.1%	70.3%	56.4%	61.8%
1963	67.1%	50.2%	68.5%	49.0%	64.9%	86.9%	90.6%	92.3%	91.1%	81.0%	62.5%	71.9%	68.5%
1964	69.1%	52.7%	41.0%	58.8%	71.8%	49.9%	83.9%	78.5%	28.8%	30.1%	31.1%	59.1%	48.1%
1965	22.2%	15.6%	36.2%	36.2%	17.5%	21.1%	42.1%	61.3%	48.0%	47.6%	38.9%	23.9%	27.5%
1966	38.7%	30.8%	33.1%	32.9%	36.6%	37.6%	43.2%	49.9%	37.7%	36.3%	49.1%	61.7%	38.5%
1967	62.1%	62.5%	60.8%	65.2%	61.2%	77.2%	67.8%	55.8%	21.2%	24.6%	18.4%	38.8%	37.9%
1968	13.2%	33.9%	31.5%	20.3%	22.3%	23.3%	44.7%	55.7%	57.6%	62.3%	48.3%	31.8%	28.1%
1969	56.0%	25.3%	28.9%	25.0%	22.0%	35.6%	54.7%	59.1%	58.6%	27.0%	32.3%	28.3%	32.6%
1970	24.6%	22.5%	20.0%	25.2%	17.2%	23.2%	39.0%	53.7%	60.7%	48.4%	65.0%	64.8%	29.7%
1971	64.3%	66.7%	68.4%	79.2%	77.9%	77.7%	76.4%	14.9%	20.6%	24.9%	23.1%	25.1%	34.2%
1972	36.5%	29.0%	46.1%	54.2%	18.3%	23.9%	30.6%	36.6%	50.2%	52.5%	58.0%	60.6%	32.6%
1973	45.6%	33.6%	27.8%	25.7%	30.7%	21.2%	13.6%	24.4%	32.4%	13.0%	22.5%	32.4%	23.0%
1974	12.3%	38.2%	43.5%	51.9%	29.2%	38.8%	64.6%	43.3%	19.0%	41.2%	13.9%	27.6%	30.5%
1975	30.1%	13.0%	27.6%	31.7%	11.2%	11.7%	23.9%	31.2%	42.8%	54.8%	68.2%	70.1%	22.8%
1976	58.7%	58.9%	56.5%	13.8%	14.2%	22.2%	29.2%	29.6%	40.0%	21.3%	22.8%	24.1%	25.0%
1977	26.9%	22.6%	29.8%	11.4%	17.3%	26.4%	32.9%	55.1%	64.3%	57.1%	51.1%	61.3%	26.6%
1978	61.1%	58.8%	60.4%	62.7%	66.2%	49.2%	68.0%	7.3%	17.8%	29.2%	35.1%	52.9%	30.8%
1979	21.0%	17.7%	14.5%	14.8%	15.5%	18.4%	27.9%	33.2%	48.3%	62.8%	63.6%	63.1%	23.4%
1980	66.2%	62.2%	56.0%	54.2%	28.7%	41.1%	58.2%	76.4%	36.2%	35.7%	44.8%	48.2%	46.9%
1981	49.4%	43.8%	27.2%	23.9%	25.6%	7.0%	18.5%	24.5%	36.0%	21.7%	20.7%	30.8%	20.1%
1982	45.9%	48.6%	48.0%	48.9%	16.2%	34.2%	50.6%	66.2%	70.8%	72.7%	69.6%	67.2%	42.5%
1983	55.1%	37.3%	26.2%	32.5%	27.6%	27.2%	38.6%	50.0%	57.8%	59.6%	47.0%	89.7%	39.6%
1984	65.7%	58.4%	62.5%	68.1%	70.3%	76.7%	88.1%	71.3%	72.1%	39.9%	36.5%	34.9%	54.8%
1985	15.2%	20.7%	17.2%	20.5%	24.5%	12.8%	19.6%	36.1%	49.8%	21.7%	12.2%	23.2%	19.5%
% TOT	34.3%	29.0%	31.6%	25.0%	23.4%	24.4%	37.7%	40.5%	34.9%	30.3%	32.5%	36.7%	30.6%

PERCENT OF TOTAL SPRINGFLOW TO STREAM FLOW AT THE GUADALUPE RIVER AT VICTORIA (USGS GAGE 08176500)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	% TOTAL
1940	79.3%	56.5%	62.8%	41.3%	49.4%	36.9%	5.5%	72.1%	82.6%	60.3%	6.0%	7.8%	18.8%
1941	17.2%	11.4%	10.9%	12.7%	5.5%	13.3%	23.3%	40.8%	43.5%	39.6%	42.2%	52.6%	15.5%
1942	54.9%	58.0%	58.1%	17.9%	27.7%	48.7%	8.0%	48.3%	14.9%	24.0%	35.3%	40.6%	24.7%
1943	40.1%	47.4%	45.5%	47.9%	52.0%	34.0%	48.8%	67.7%	60.4%	65.6%	66.3%	58.5%	50.1%
1944	34.8%	30.3%	20.4%	38.5%	18.4%	20.5%	47.0%	57.9%	27.9%	55.9%	37.3%	23.4%	29.2%
1945	16.6%	19.7%	24.0%	12.3%	43.0%	45.2%	57.7%	71.1%	76.1%	42.0%	58.1%	45.8%	29.6%
1946	37.0%	26.4%	17.3%	33.2%	27.1%	26.3%	86.3%	65.2%	13.2%	14.4%	17.5%	28.5%	24.5%
1947	18.5%	29.1%	28.9%	27.1%	26.8%	43.9%	52.9%	35.5%	68.6%	75.1%	70.9%	60.7%	34.8%
1948	65.5%	51.4%	53.4%	73.8%	26.8%	64.3%	49.4%	65.8%	91.4%	77.4%	92.3%	81.9%	59.0%
1949	74.3%	33.9%	24.0%	10.4%	17.3%	40.3%	49.0%	65.0%	70.5%	15.5%	46.9%	41.1%	27.8%
1950	54.7%	44.4%	59.0%	29.6%	42.3%	16.9%	63.5%	97.4%	90.5%	96.3%	93.5%	78.6%	47.9%
1951	85.0%	73.0%	71.6%	67.2%	52.9%	15.8%	95.7%	150.0%	73.2%	114.7%	89.8%	88.0%	57.6%
1952	80.8%	65.2%	78.5%	47.1%	20.1%	21.6%	56.8%	123.9%	19.3%	45.5%	35.2%	19.8%	31.4%
1953	23.2%	44.0%	54.2%	50.8%	13.2%	87.4%	79.1%	47.3%	19.3%	19.1%	51.2%	44.5%	31.7%
1954	60.5%	64.8%	71.5%	56.0%	37.6%	92.6%	137.0%	151.3%	148.9%	160.8%	105.4%	90.7%	74.9%
1955	88.3%	25.0%	65.3%	63.4%	24.2%	24.5%	75.6%	64.2%	84.3%	133.5%	138.6%	91.2%	49.2%
1956	85.2%	65.7%	87.0%	71.7%	44.0%	126.0%	123.6%	183.4%	143.7%	47.1%	157.5%	23.3%	65.6%
1957	106.5%	30.5%	14.7%	11.1%	7.7%	9.2%	46.2%	64.6%	8.1%	5.4%	11.0%	23.3%	11.1%
1958	12.0%	6.7%	15.3%	28.5%	14.4%	31.0%	40.1%	58.5%	24.1%	27.7%	24.8%	37.2%	19.0%
1959	40.2%	26.1%	38.2%	15.4%	29.9%	40.8%	35.3%	52.3%	57.0%	19.4%	36.2%	42.0%	31.2%
1960	33.0%	32.1%	39.9%	38.5%	22.4%	18.9%	19.3%	27.8%	46.0%	6.7%	7.5%	18.3%	17.3%
1961	15.6%	13.3%	24.0%	34.9%	46.0%	7.5%	20.6%	42.4%	24.6%	48.3%	22.5%	47.8%	21.2%
1962	51.4%	50.0%	55.9%	45.7%	55.7%	43.6%	67.5%	94.0%	49.4%	62.0%	56.2%	50.1%	54.1%
1963	56.6%	37.4%	58.4%	50.7%	73.8%	88.1%	93.7%	137.8%	117.3%	116.9%	36.1%	61.4%	62.5%
1964	65.9%	39.0%	26.4%	46.0%	65.6%	54.6%	100.8%	81.2%	33.0%	33.0%	32.1%	59.0%	44.9%
1965	20.1%	9.9%	35.1%	36.3%	15.6%	13.5%	41.3%	57.5%	51.4%	32.6%	20.3%	21.5%	21.8%
1966	40.2%	29.4%	30.8%	22.5%	18.1%	36.3%	43.7%	55.8%	42.9%	42.8%	51.4%	59.4%	33.9%
1967	58.9%	59.9%	61.3%	64.3%	67.6%	72.7%	85.0%	54.9%	3.4%	14.7%	18.0%	35.7%	19.6%
1968	9.7%	25.9%	31.5%	20.7%	11.9%	9.3%	31.7%	48.0%	27.4%	53.7%	46.7%	22.0%	19.2%
1969	47.0%	13.4%	16.0%	13.5%	17.0%	34.3%	51.6%	53.7%	48.5%	31.1%	35.2%	29.6%	24.8%
1970	25.7%	26.1%	19.3%	28.5%	18.7%	22.2%	44.0%	55.7%	56.0%	45.6%	64.9%	65.1%	30.9%
1971	63.6%	64.3%	61.2%	73.9%	77.9%	61.0%	68.6%	19.8%	11.6%	25.3%	28.5%	25.1%	32.6%
1972	35.3%	31.2%	43.3%	54.7%	9.1%	18.9%	29.0%	34.4%	45.9%	47.4%	53.4%	57.7%	23.7%
1973	43.3%	31.0%	21.2%	11.2%	25.6%	8.4%	16.2%	22.6%	31.8%	7.1%	21.5%	31.9%	16.4%
1974	17.7%	32.9%	39.8%	46.3%	27.4%	31.4%	56.4%	48.1%	13.7%	38.5%	14.6%	22.7%	25.8%
1975	29.7%	15.3%	29.1%	28.2%	9.2%	10.8%	20.6%	31.2%	40.0%	49.3%	56.2%	46.3%	21.0%
1976	55.7%	55.8%	50.6%	9.8%	10.8%	19.7%	28.0%	33.2%	35.7%	16.5%	13.6%	10.4%	18.3%
1977	24.2%	15.7%	30.2%	7.8%	15.3%	25.5%	34.1%	45.9%	49.6%	53.3%	33.2%	53.2%	21.6%
1978	51.9%	46.3%	49.1%	44.6%	53.5%	30.2%	55.9%	11.3%	12.4%	30.2%	28.1%	50.6%	29.2%
1979	12.7%	16.2%	16.6%	12.4%	8.7%	11.4%	28.6%	32.0%	35.0%	57.8%	57.2%	60.4%	18.3%
1980	46.7%	52.0%	56.8%	57.3%	16.7%	39.0%	55.8%	77.0%	29.9%	42.0%	48.7%	51.1%	40.9%
1981	50.4%	46.2%	33.4%	25.2%	21.0%	6.8%	16.3%	29.3%	4.6%	23.4%	11.8%	29.4%	14.4%
1982	38.3%	27.8%	39.8%	43.1%	9.3%	32.1%	50.1%	69.8%	70.0%	58.2%	35.2%	56.4%	30.9%
1983	55.5%	25.5%	19.0%	31.2%	28.7%	33.9%	29.0%	55.3%	43.7%	47.6%	40.0%	85.4%	35.2%
1984	47.2%	51.7%	40.7%	55.2%	54.5%	61.4%	108.6%	106.1%	92.6%	31.5%	37.1%	32.0%	46.6%
1985	16.9%	23.9%	17.5%	16.6%	24.8%	17.2%	23.5%	41.8%	55.9%	26.1%	15.5%	20.3%	21.5%
% TOT	28.8%	24.8%	29.0%	22.0%	16.9%	19.2%	29.7%	43.3%	23.3%	24.3%	25.0%	31.0%	24.9%

COMAL AND SAN MARCOS SPRINGS
HISTORICAL AND FUTURE CONDITIONS
(ACRE-FEET)

Year	Historical		S. A. Alternative I		S. A. Alternative III	
	Comal	San Marcos	Comal	San Marcos	Comal	San Marcos
1940	208,430	76,989	213,326	139,962	222,433	140,451
1941	260,720	132,776	217,130	135,335	229,772	136,384
1942	265,140	111,900	192,478	133,100	211,294	134,645
1943	247,490	96,332	139,246	122,439	165,423	124,778
1944	254,940	134 096	144,386	122,960	171,551	125,581
1945	270,840	138,043	150,249	126,287	182,958	129,270
1946	276,320	150,511	141,187	129,622	174,288	132,959
1947	257,900	125,416	123,188	126,860	156,393	130,169
1948	201,070	76,250	71,727	117,675	105,467	120,991
1949	212,020	86,461	38,291	109,062	72,891	112,401
1950	189,700	76,492	17,100	103,634	51,376	106,984
1951	148,860	68,618	835	97,842	28,010	101,975
1952	164,400	75,102	6,172	96,686	41,993	101,521
1953	142,670	97,859	2,726	99,657	37,112	103,485
1954	98,360	75,449	0	92,157	11,369	99,207
1955	66,820	61,148	0	79,569	43	92,366
1956	27,997	47,564	0	67,600	0	83,734
1957	138,740	110,270	79,652	91,496	128,489	103,858
1958	234,080	153,440	190,989	125,994	234,416	131,962
1959	229,240	116,050	163,921	121,878	201,275	132,217
1960	241,690	141,410	161,089	126,077	196,733	129,879
1961	247,960	138,260	156,167	127,313	191,694	131,014
1962	193,380	95,850	103,580	119,093	136,452	122,613
1963	150,800	78,710	52,576	108,380	86,544	111,669
1964	138,560	70,180	38,192	103,355	74,132	106,821
1965	209,230	123,020	68,548	109,252	105,254	112,849
1966	193,430	111,360	66,574	111,771	104,672	115,534
1967	136,450	77,650	51,522	107,872	89,276	111,619
1968	246,750	143,060	81,147	110,373	118,500	114,146
1969	212,380	117,820	101,508	115,468	137,995	119,155
1970	226,650	144,570	110,335	116,867	147,598	120,610
1971	159,810	91,850	111,541	115,490	149,349	119,272
1972	264,550	116,650	125,829	115,655	163,143	119,477
1973	294,010	158,200	206,668	127,351	237,999	130,979
1974	283,820	133,770	210,467	132,843	232,411	135,541
1975	295,430	167,390	233,096	137,158	253,537	139,473
1976	280,110	153,140	204,208	138,157	224,980	140,250
1977	289,690	161,550	226,579	137,586	247,265	139,682
1978	239,880	87,410	205,822	134,659	224,664	136,615
1979	292,730	144,950	251,508	138,664	268,200	140,505
1980	207,240	95,950	208,972	137,263	226,128	139,036
Average	212,153	111,305	118,744	117,328	147,392	121,504
Total - Both Springs		323,458		236,072		268,896

Current pumpage = 450,000 acre-feet/year

S. A. Alternative I Pumpage = 400,000 acre-feet/year, Recharge = historical

S. A. Alternative III Pumpage = 350,000 acre-feet/year, Recharge = historical

CALCULATED ANNUAL RECHARGE TO THE EDWARDS AQUIFER BY BASIN, 1934-1985 (IN THOUSANDS OF ACRE-FEET)

Calendar year	Nueces-West Nueces River basin	Frio-Dry Frio River basin[1]	Sabinal River basin[1]	Area between Sabinal River and Medina River basins[1]	Medina Lake	Area between Cibolo Creek and Medina River basins[1]	Cibolo-Dry Comal Creek basin	Blanco River basin[1]	Total
1934	8.6	27.9	7.5	19.9	46.5	21.0	28.4	19.8	179.6
1935	411.3	192.3	56.6	166.2	71.1	138.2	182.7	39.8	1,258.2
1936	176.5	152.4	43.5	142.9	91.6	108.9	146.1	42.7	909.6
1937	28.8	75.7	21.5	61.3	80.5	42.8	63.9	21.2	400.7
1938	63.5	69.3	20.9	54.1	65.5	46.2	76.8	36.4	432.7
1939	222.0	49.5	17.0	33.1	42.4	9.3	9.6	11.1	399.0
1940	50.4	60.3	23.8	56.6	38.8	29.3	30.8	18.8	308.8
1941	89.9	151.8	50.6	139.0	54.1	116.3	191.2	57.8	850.7
1942	103.5	95.1	34.0	84.4	51.7	66.9	93.6	28.6	557.8
1943	36.5	42.3	11.1	33.8	41.5	29.5	58.3	20.1	273.1
1944	64.1	76.0	24.8	74.3	50.5	72.5	152.5	46.2	560.9
1945	47.3	71.1	30.8	78.6	54.8	79.6	129.9	35.7	527.8
1946	80.9	54.2	16.5	52.0	51.4	105.1	155.3	40.7	556.1
1947	72.4	77.7	16.7	45.2	44.0	55.5	79.5	31.6	422.6
1948	41.1	25.6	26.0	20.2	14.8	17.5	19.9	13.2	178.3
1949	166.0	86.1	31.5	70.3	33.0	41.8	55.9	23.5	508.1
1950	41.5	35.5	13.3	27.0	23.6	17.3	24.6	17.4	200.2
1951	18.3	28.4	7.3	26.4	21.1	15.3	12.5	10.6	139.5
1952	27.9	15.7	3.2	30.2	25.4	50.1	102.3	20.7	275.5
1953	21.4	15.1	3.2	4.4	36.2	20.1	42.3	24.9	167.6
1954	61.3	31.6	7.1	11.9	25.3	4.2	10.0	10.7	162.1
1955	128.0	22.1	0.6	7.7	16.5	4.3	3.3	9.5	192.0
1956	15.6	4.2	1.6	3.6	6.3	2.0	2.2	8.2	43.7
1957	108.6	133.6	65.4	129.5	55.6	175.6	397.9	76.4	1,142.6
1958	266.7	300.0	223.8	294.9	95.5	190.9	268.7	70.7	1,711.2
1959	109.6	158.9	61.6	96.7	94.7	57.4	77.9	33.6	690.4
1960	88.7	128.1	64.9	127.0	104.0	89.7	160.0	62.4	824.8
1961	85.2	151.3	57.4	105.4	88.3	69.3	110.8	49.4	717.1
1962	47.4	46.6	4.3	23.5	52.3	16.2	24.7	18.9	239.4
1963	39.7	27.0	5.0	10.3	41.9	9.3	21.3	16.2	170.2
1964	126.1	57.1	16.3	61.3	43.3	35.8	51.1	22.2	413.2
1965	92.9	83.0	23.2	104.0	54.6	78.8	115.3	66.7	623.5
1966	169.2	134.0	37.7	78.2	50.5	44.5	66.5	34.6	615.2
1967	82.2	137.9	30.4	64.8	44.7	30.2	57.3	19.0	466.5
1968	130.8	176.0	66.4	198.7	59.9	83.1	120.5	49.3	884.7
1969	119.7	113.8	30.7	84.2	55.4	60.2	99.9	46.6	610.5
1970	112.6	141.9	35.4	81.6	68.0	68.8	113.8	39.5	661.6
1971	263.4	212.4	39.2	155.6	68.7	81.4	82.4	22.2	925.3
1972	108.4	144.6	49.0	154.6	87.9	74.3	104.2	33.4	756.4
1973	190.6	256.9	123.9	286.4	97.6	237.2	211.7	82.2	1,486.5
1974	91.1	135.7	36.1	115.3	96.2	68.1	76.9	39.1	658.5
1975	71.8	143.6	42.9	195.9	93.4	138.8	195.7	85.9	923.0
1976	150.7	238.6	68.2	182.0	94.5	47.9	54.3	57.9	894.1
1977	102.9	193.0	62.7	159.5	77.2	92.9	191.6	66.7	952.0
1978	69.8	73.1	30.9	103.7	76.7	49.6	72.4	26.3	502.5
1979	128.4	201.4	68.6	203.1	89.4	85.4	266.3	75.2	1,112.6
1980	58.6	85.6	42.6	25.3	88.3	18.8	55.4	31.8	406.4
1981	205.0	365.2	105.6	252.1	91.3	165.0	196.8	67.3	1,448.4
1982	19.4	123.4	21.0	90.9	76.8	22.6	40.1	23.5	417.7
1983	29.2	85.9	20.1	42.9	74.4	31.9	62.5	23.2	420.1
1984	32.4	40.4	8.8	18.1	43.9	11.3	16.9	25.9	197.9
1985	105.9	186.9	50.7	148.5	64.7	136.7	259.2	50.7	1,003.3
AVERAGE	100.9	110.4	37.9	92.9	60.0	65.0	100.8	36.7	[2] 604.5

[1] Includes recharge from gaged and ungaged areas within the basin.
[2] Average totals may not be identical because of rounding procedures.

Source: Ozuna, et al, 1987, Edwards Underground Water District, Bulletin 45.

CALCULATED ANNUAL DISCHARGE FROM THE EDWARDS AQUIFER BY COUNTY, 1934-1985 (IN THOUSANDS OF ACRE-FEET)

Year	Kinney-Uvalde Counties	Medina County	Bexar County	Comal County	Hays County	Total	Total spring discharge	Total well discharge
1934	12.6	1.3	109.3	229.1	85.6	437.9	336.0	101.9
1935	12.2	1.5	171.8	237.2	96.9	519.6	415.9	103.7
1936	26.6	1.5	215.2	261.7	93.2	598.2	485.5	112.7
1937	28.3	1.5	201.8	252.5	87.1	571.2	451.0	120.2
1938	25.2	1.6	187.6	250.0	93.4	557.8	437.7	120.1
1939	18.2	1.6	122.5	219.4	71.1	432.8	313.9	118.9
1940	16.1	1.6	116.7	203.8	78.4	416.6	296.5	120.1
1941	17.9	1.6	197.4	250.0	134.3	601.2	464.4	136.8
1942	22.5	1.7	203.2	255.1	112.2	594.7	450.1	144.6
1943	19.2	1.7	172.0	249.2	97.2	539.3	390.2	149.1
1944	11.6	1.7	166.3	252.5	135.3	567.4	420.1	147.3
1945	12.4	1.7	199.8	263.1	137.8	614.8	461.5	153.3
1946	6.2	1.7	180.1	261.9	134.0	583.9	428.9	155.0
1947	13.8	2.0	193.3	256.8	127.6	593.5	426.5	167.0
1948	9.2	1.9	159.2	203.0	77.3	450.6	281.9	168.7
1949	13.2	2.0	165.3	209.5	89.8	479.8	300.4	179.4
1950	17.8	2.2	177.3	191.1	78.3	466.7	272.9	193.8
1951	16.9	2.2	186.9	150.5	69.1	425.6	215.9	209.7
1952	22.7	3.1	187.1	133.2	78.8	424.9	209.5	215.4
1953	27.5	4.0	193.7	141.7	101.4	468.3	238.5	229.8
1954	26.6	6.3	208.9	101.0	81.5	424.3	178.1	246.2
1955	28.3	11.1	215.2	70.1	64.1	388.8	127.8	261.0
1956	59.6	17.7	229.6	33.6	50.4	390.9	69.8	321.1
1957	29.0	11.9	189.4	113.2	113.0	456.5	219.2	237.3
1958	23.7	6.6	199.5	231.8	155.9	617.5	398.2	219.3
1959	43.0	8.3	217.5	231.7	118.5	619.0	384.5	234.5
1960	53.7	7.6	215.4	235.2	143.5	655.4	428.3	227.1
1961	56.5	6.4	230.3	249.5	140.8	683.5	455.3	228.2
1962	64.6	8.1	220.0	197.5	98.8	589.0	321.1	267.9
1963	51.4	9.7	217.3	155.7	81.9	516.0	239.6	276.4
1964	49.3	8.6	201.0	141.8	73.3	474.0	213.8	260.2
1965	46.8	10.0	201.1	194.7	126.3	578.9	322.8	256.1
1966	48.5	10.4	198.0	198.9	15.4	571.2	315.3	255.9
1967	81.1	15.2	239.7	139.1	82.3	557.4	216.1	341.3
1968	58.0	9.9	207.1	238.2	146.8	660.0	408.3	251.7
1969	88.5	13.6	216.3	218.2	122.1	658.7	351.2	307.5
1970	100.9	16.5	230.6	229.2	149.9	727.1	397.7	329.4
1971	117.0	32.4	262.8	168.2	99.1	679.5	272.7	406.8
1972	112.6	28.8	247.7	234.3	123.7	747.1	375.8	371.3
1973	96.5	14.9	273.0	289.3	164.3	838.0	527.6	310.4
1974	133.3	28.6	272.1	286.1	161.1	881.2	483.8	377.6
1975	112.0	22.6	259.0	296.0	178.6	868.2	540.4	327.8
1976	136.4	19.4	253.2	279.7	164.7	853.4	503.9	349.5
1977	156.5	19.9	317.5	295.0	172.0	960.9	580.3	380.6
1978	154.3	38.7	269.5	245.7	99.1	807.3	375.5	431.8
1979	130.1	32.9	294.5	300.0	157.0	914.5	523.0	391.5
1980	151.0	39.9	300.3	220.3	107.9	819.4	328.3	491.1
1981	104.2	26.1	280.7	241.8	141.6	794.4	407.3	387.1
1982	129.2	33.4	305.1	213.2	105.5	786.4	333.3	453.1
1983	107.7	29.7	271.6	186.6	118.5	720.1	301.6	418.5
1984	161.1	46.8	309.7	108.9	86.7	702.3	172.6	528.8
1985	156.9	59.2	295.5	200.0	144.9	856.5	334.0	522.5

Source: Ozuna, et al, 1987, Edwards Underground Water District Bulletin 45.

BIBLIOGRAPHY

An extensive literature review accompanied the preparation of the three technical sections included in this study. An extensive bibliographic reference has been documented, but due to space constraints, has not been included herein. Those parties interested in obtaining a copy of the bibliography for the technical sections may do so by contacting Mr. John H. Specht, General Manager, Guadalupe-Blanco River Authority.

PAUL D. THORNHILL

Mr. Thornhill obtained his BSCE degree from the University of Texas at Austin in December 1971. His early work experience was with the Texas Water Rights Commission. For the last 11 years, Mr. Thornhill has continued his involvement in water resources within the State of Texas, and specifically within the Guadalupe, San Antonio, and Nueces River basins as an engineer with the consulting firm of Espey, Huston & Associates, Inc.

Mr. Thornhill has also performed numerous evaluations and studies in the water resources field in other river basins within the state, including the Brazos River basin and the Colorado River basin. Mr. Thornhill is currently registered in the State of Texas as a Professional Engineer, and is also registered in nine other states. Mr. Thornhill has pursued water resources education by continuing graduate studies at the University of Texas, completing various short courses, and presenting numerous papers.

ROLLIN W. HARDEN

Mr. Harden is a hydrologist and geologist who has specialized in underground water for the past 30 years. His early work experience was with the Texas Board of Water Engineers. For the past 25 years he has been in the consulting field, and for the past 16 years has been president of R.W. Harden & Associates, Inc., an independent, Austin-based consulting firm. Experience included more than 4,000 projects in 30 states for major corporations, consulting firms, and state and local governments. A large number of the projects have dealt with the Edwards Limestone in South and West Texas and especially in the San Antonio segment. The Edwards work has involved hundreds of projects including availability investigations, exploration and development of supplies, environmental assessments, and studies of recharge, pumpage, spring flow, water levels, water quality, "bad-water" line, and effects of well development.

ROGER NEVOLA

Mr. Nevola received a BS in mechanical engineering from Stanford University in 1968 and a J.D. from the University of Texas in 1974. He joined Vinson & Elkins in 1974 and was admitted to the partnership in 1981.

Mr. Nevola is a member of the Environmental and Natural Resources Law, Public Law, and Public Utilities sections of the State Bar of Texas and a member of the Natural Resources and Administrative Law sections of the American Bar Association. He is a Life Fellow of the Texas Bar Foundation and a past chairman of the Administrative Law Committee of the State Bar of Texas. He is a director of the Texas Water Conservation Association, a member of the National Water Resources Association, and the Texas reporter for the Mineral Law Newsletter of the Rocky Mountain Mineral Law Foundation. He has been an adjunct professor at the University of Texas School of Law, teaching a water law seminar.

Mr. Nevola's principal areas of practice are administrative law (including water, environmental, natural resources, mining, energy, and public utility law) and related litigation and contract negotiation.

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Student Environmental Action Coalition

April 21, 1992

attn: Lesli Gray
House Subcommittee on Environment and Natural Resources
House Merchant Marine and Fisheries Committee
Rm 545, Ford House Office Building
Washington. D.C. 20515

Dear Subcommittee Members:

California/Hawaii Student Environmental Action Coalition (SEAC) respectfully submits its comments on the issues involved in the re-authorization of the Endangered Species Act. These comments were developed for the first hearing on this issue of the House subcommittee on Environment and Natural Resources on April 1, 1993.

Background

The Student Environmental Action Coalition is a grassroots organization led by students to provide support, materials, and training for youth organizing for the environment and justice on high school and college campuses across the United States. Since a large percentage of the species on the Federal Endangered Species list exist within the state of California, the members of SEAC in our state are especially concerned with the re-authorization of the ESA. In addition to the incredible biological diversity that exists within the state, we also have some of the most intense development pressures in the country, and an economy that is inherently dependant on natural resource base and in turn, healthy ecosystems. Furthermore, our economy is failing from years of unrealistic planning for which the present generations now suffer.

In light of the conditions of our state, it is obvious why the need for environmental protection is strong and the pressures toward compromise so great. As students we look towards the future; we recognize the necessity of maintaining healthy ecosystems for long-term planning of sustainable economies. We challenge the premise of the "jobs vs. owls" question; We understand that any compromise of ecosystem protection for areas where species are already on the brink of extinction is prioritizing short-term profits at the expense of sustainable economies for future generations.

Despite the intense pressure towards development, our legislature has recognized the need to protect biodiversity as strong enough to warrant passing the Endangered Species Act (ESA) in 1973, and to strengthen it several times since. For the last year, we have been working on a campaign to educate others in our state of the need to protect biodiversity and to generate support for strengthening of the ESA. We feel that although there is definitely room for improving the Act, it is one of our most important tools for defending our environment and our future from the short-term-profit-oriented actions of our industrial society.

Our organization supports strengthening the Act; towards this end we supported H.R. 4045, the Endangered Species Act Amendments of 1992," which was introduced in the last session of Congress by Representatives Gerry Studds (D-MA) and John Dingell (D-MI). We continue to support the work of your subcommittee on the current version of this bill, and encourage your efforts to further strengthen the Act. As we begin the re-authorization process for the current session of Congress, we are enthusiastic about the discussions that occurred at the hearing on April 1st. Many important issues were raised, such as the need to increase funding for the Act, fascilitate inter-agency cooperation, and to improve the recovery process for species once listed. However, there are several areas of particular concern to us which have not been addressed so far, and that we feel are important to help strengthen the Act.

Habitat Conservation Plans: The 1992 amendments proposed in H.R. 4045 recommend the creation of a fund for "Habitat Conservation Planning", authorizing $20 million to help finance the development of HCP's. In addition, procedures for developing HCP's were established. The following points should be considered in developing the 1993 amendments:

A. The HCP process is not consistent with the original intent of Congress to protect species from development pressures. These plans allow for a "taking" or destruction of a threatened or endangered species' habitat in exchange for the development of a plan to compensate by creating habitat elsewhere. The intent of the Act is to protect and recover species, not to keep them on the brink of extinction. Experimentation with habitat that is already scarce does not fascilitate recovery of species who are already threatened or endangered.

B. According to an analysis of R. Webster in the San Diego Law Review, HCP's have lead to progressive weakening of ecosystem protection as areas for development become more scarce, and habitat less available. It has been noted that since the development of HCP's emphasis has been placed on mere survival of endangered species rather than on guaranteeing their populations' increase. In addition, a reluctance to designate areas as "critical habitat" is correlated with the increased use of HCP's to deal with apparent conflicts of interests.[1]

C. What indication do we have that a given HCP will work to compensate for taking habitat that a species is currently occupying in exchange for a plan to create similar habitat conditions elsewhere?

1) The first HCP, a prototype for the ones to follow, developed for San Bruno Mountain, mandates a 30 year mitigation project in which developers are required to fund habitat restoration and obligated to create new endangered butterfly habitat. This mountain represents the only part of an entire ecosystem, the Fransiscan region, which is not buried under the concrete of the city. To date, restoration efforts have been half-hearted. Not one square foot of new habitat has been created, nor have attempts at transplanting its host plant, lupine, been successful.[2] In fact, we were unable to find a single case in which mitigation efforts planned through an HCP demonstrated successful creation of habitat in exchange for habitat taken.

2) In general, long term mitigation projects are not feasible. No process of accountability has been developed to insure that these plans are carried out, or that they reflect a biologically sound scientific understanding of the needs of a species. Lack of funding, which has already crippled the ESA in general, makes monitoring and enforcement impractical. Furthermore, what kind of penalties are justified when a plan fails to create substitute habitat? Who is responsible for carrying out an HCP when the company involved goes bankrupt.

D. Although not always the case, HCP's have often been developed without adequate citizen input. San Bruno Mountain is a good example of how citizens input was ignored, and development of the HCP occurred independent of the work of members of the community. This reduces the credibility of the process and removes an important check to the industry influence in management of natural resources.

> The following or similar modifications must be made to the HCP process if we are to strengthen the ESA this year:
>
> 1. Require proven success with small, representative pilot projects before any approval of full-scale HCP's. In addition, all past HCP's should be evaluated and any that aren't fulfilling their objectives should be improved. Further taking of habitat in these situations should be prohibited, at least until adequate recovery methods are in place.
> 2. Increase citizens participation and power in HCP planning and oversight.
> 3. Guarantee restoration funding and performance
> 4. Perform much needed scientific monitoring of HCP programs

Enforcement: fines and penalties for violation of the ESA. Any effective law provides a necessary deterrent for its violation.

A. Under the current version of the ESA the maximum civil penalties that can be imposed for violators of the law is $50,000 and six to twelve months in prison. This is often like a slap on the hand in comparison to the profits made by corporate violators of the Act. For example, the recent logging of Owl Creek in Humboldt County, CA (Nov. 1992) generated $900,000 worth of timber that was potentially taken in violation of the ESA.[3] The USFWS is currently completing an investigation of Pacific Lumber Company (PALCO) to determine if a violation occurred. If found guilty the maximum fine of $50,000 is a mere cost of doing business, not an incentive to avoid violation.

**Penalties for violating the Endangered Species Act should be devised using the same concept as those for violation of other laws: the penalty should reflect the severity of the crime. Since the ESA is one of our strongest laws meant as a last resort, violation is a serious crime.

1. Profit and goods confiscation. All profits or goods resulting from an action that is found to be in violation of the ESA should be seized. Any money seized should go back into a fund for enforcement of the Act.

2. Fines based on potential profit and restoration costs. Fines for violating the Act should be a function of the amount of revenue that would have been generated by the activity, had it not been intercepted, and the amount of money required to restore any damaged habitat.

3. Jail time mandatory for violators. A minimum of six months and a maximum of five years is recommended.

Recovery Plans. The goal of the ESA is to recover species on the brink of extinction, so they can be de-listed. Fewer than 60% of the federally listed species have recovery plans that have been developed or implemented.[4] Strategies must be developed to fascilitate the development of recovery plans and funding must be directed towards this end as well.

1. Set deadlines for development of recovery plans. A species should be guaranteed a recovery plan within two years of listing.

2. Funding for USFWS to develop recovery plans must be guaranteed. USFWS should determine how much funding it needs to accomplish these goals given the average number of species listed per year currently. The proportion of funding allocated for this specifically should be spelled out in the Act.

3. USFWS should prioritize development of recovery plans for multi-species associations and should employ an ecosystem, integrated approach, rather than looking only at the survival of the individual species. Tools such as Gap Analysis and the biological inventory of the U. S.5 should be used to identify the needs of multiple species.

4. Candidate species should be afforded greater protection, and certainly should be considered in development of recovery plans. If a recovery plan is being developed for a listed species that occupies the same area as another candidate species, both should be considered in the recovery plan.

Funding . Clearly, the most important thing that must happen for the ESA to be successful is to increase the amount of funding that is allocated for the Act. Currently, less money is spent annually on enforcement of this law than the cost of building one mile of interstate highway. We must back our commitment to preserving biodiversity with funding that reflects its importance.

1. Increase funding to a minimum of $150 million/year for now, with a commitment to allocating $2 billion over the next 5 years.

Inter-agency cooperation. Under the previous administration, environmental protection has deteriorated partly due to conflict between various agencies of the same government. This must be remedied if the ESA is to be effective.

1. Require that any agency advocating a particular action check with any related agencies and reports/policies to make sure there are no contradictions.

2. Require that any recovery plan or HCP developed consider all related agencies and is made available for their review before final publishing.

Please consider these points as your committee reviews changes to the ESA. We feel that this law is flexible, and with the recommended improvements is the strongest statute for protection of the environment in our country. Thank you for taking time to consider our testimony.

Respectfully submitted,

Stacey Shull
April 20, 1993
Regional Coordinator
Cal-Hi SEAC
Student Environmental Action Coalition

Endnotes:

1. "Habitat Condervation Plans under the Endagered Species Act," Richard E. Wevster, San Diego Law Review, Vol. 24, No. 1 of Jan./Feb. 1987.

2. Bay Area Land Watch, Fact Sheets on San Bruno Mountain P.O. Box AO, Brisbane, CA.

3. Environmental Information Protection Center (EPIC), P.O. Box 397, Garberville, CA 95542; involved in a lawsuit against PALCO and USFWS

4. Endangered Species Act of 1973 as amended by the 100th Congress, Sec. 11. (b) (1)., p. 38..

5. Endangered Species: Management Improvements Could Enhance Recovery Program, report , GAO/RCED-89-5, U.S. General Accounting Office.

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